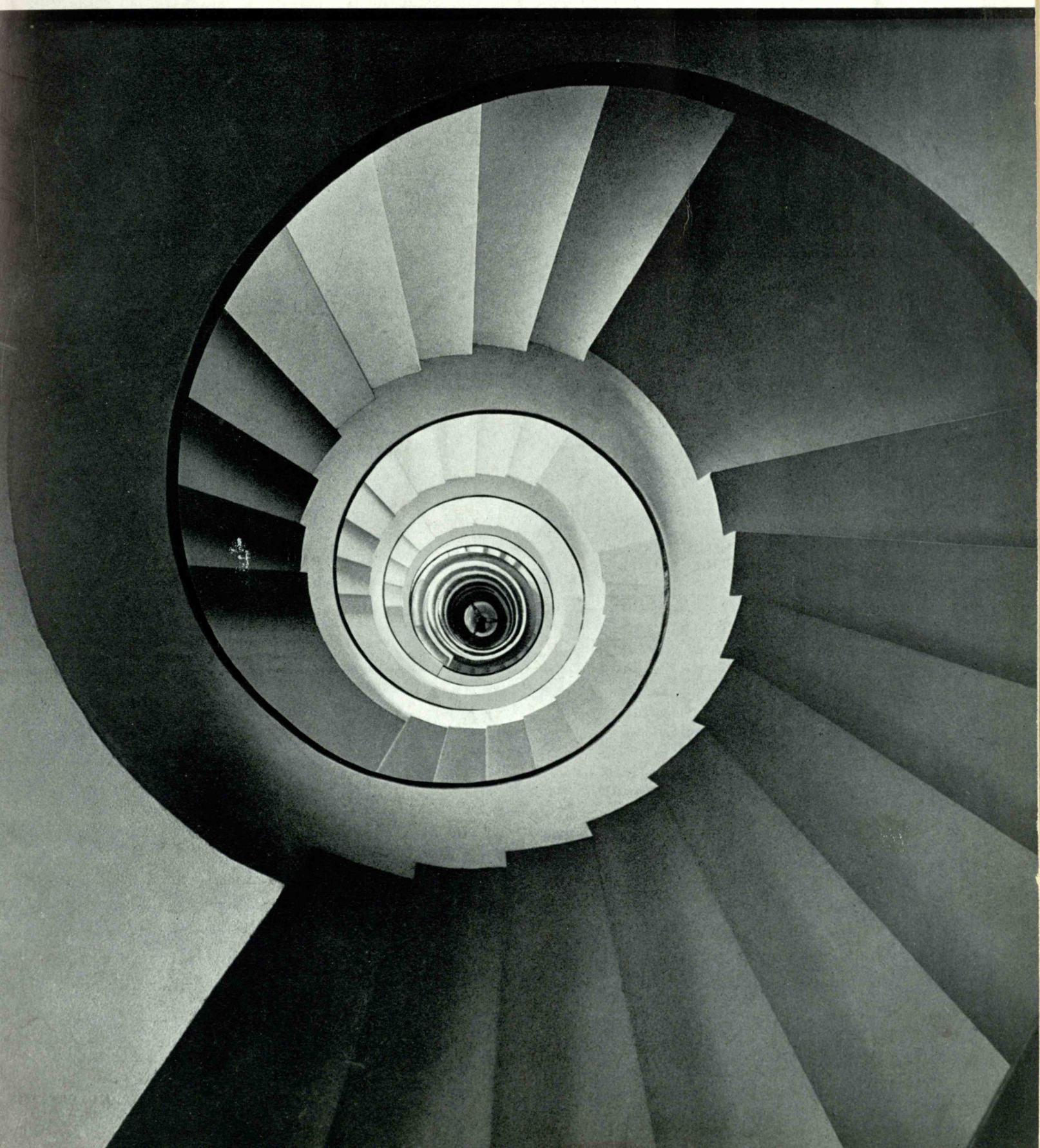
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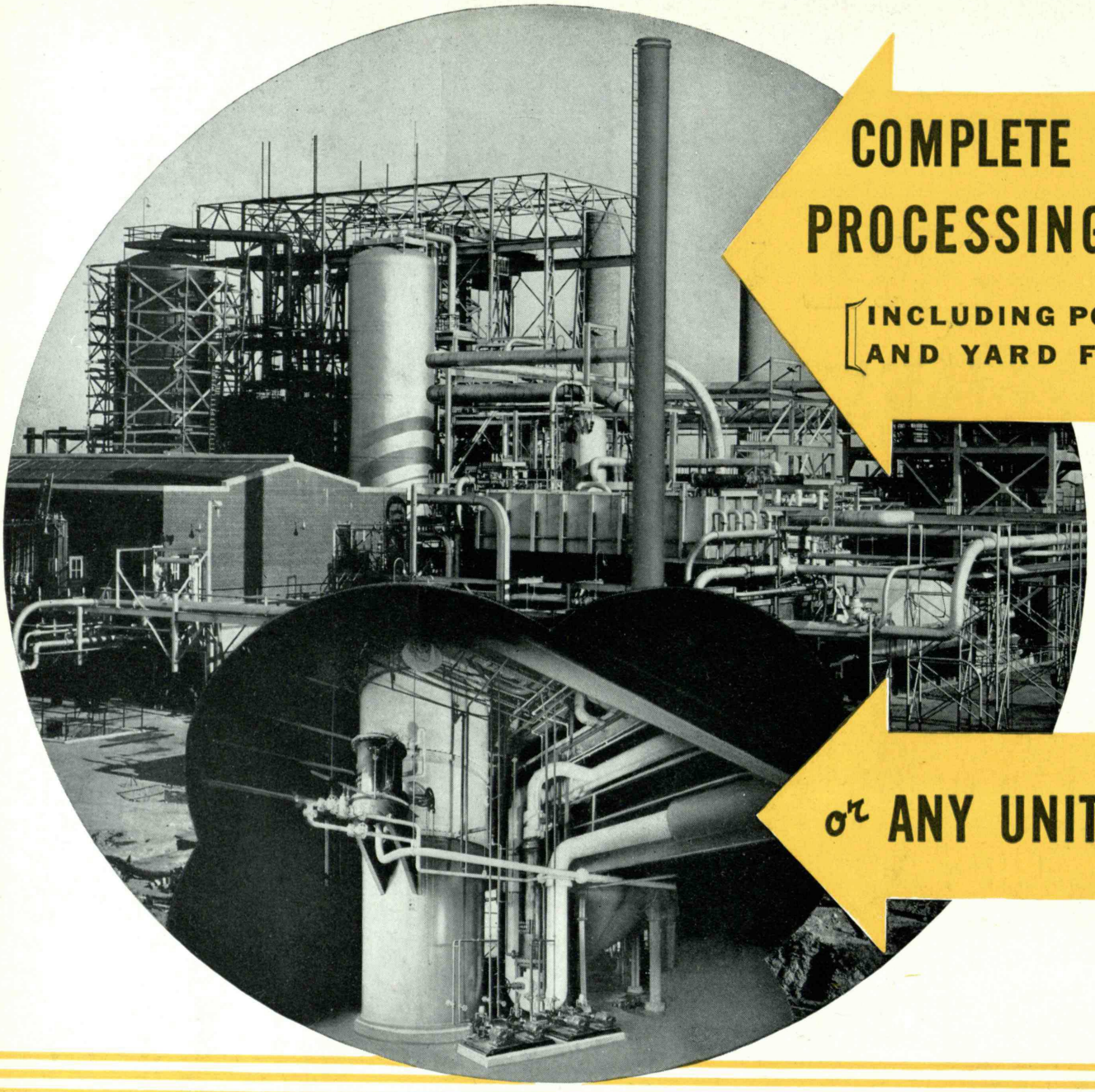
TECHNOLOGY REVIEW

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THE TABULAR VIEW

Winchell Won't. — Best known means least known, as far as language is concerned, through the familiar though paradoxical fact that men generally don't analyze the things with which they are most familiar. Hence through his study of language in its psychological aspects — an undertaking of some ten years — BENJAMIN LEE WHORF, '18, is pioneering along frontiers to be found right in the back yard. How the patterns of English word formation may be given formal expression, and how the resultant formulas enable the linguist to predict much as does the physicist, are questions which he discusses in this issue of The Review (page 61) in explaining the right of linguistics to be regarded as an exact science. Mr. Whorf has investigated spoken Aztec in Mexico, has worked on the deciphering of Mayan hieroglyphs, has lectured on linguistics at Yale. He is a special agent for the Hartford Fire Insurance Company.

Hummingbird. — Former editor of *Aviation*, now coordinator of research for the National Advisory Committee for Aeronautics, whose chairman is Vannevar Bush, '16, S. PAUL JOHNSTON, '21, tells (page 64) of efforts at vertical flight by means of the helicopter. To Da Vinci the idea of the airscrew was provocative; in our own immediate time, realization of its use seems nearing. Mr. Johnston's article constitutes a chapter of his book *Horizons Unlimited: A Graphic History of Aviation*, which Duell, Sloan and Pearce, Inc., have scheduled to appear on December 5.

Palms and Pumps. — Among prehistory's puzzles, how holes were "worried" through hard substances is one of the most interesting. It is not, of course, without fairly thorough answers. In this issue (page 66) a review of these engages LEROY L. THWING, '03, whose tales of other investigations into the records of applied technology are well remembered by Review readers. For some years connected with the New York Museum of Science and Industry, Mr. Thwing is a student of the history of technics.

Bumpers. — Ways of safeguarding drivers of automobiles against sudden death for themselves and for others are an important question to highway engineers, designers, safety engineers, and manufacturers. JOHN W. MEADER, '19, draws on a decade's experience and subsequent interest in the automotive industry in discussing (page 68) the need and two possible methods of securing better control. An economist and statistician, Mr. Meader is a member of the Society of Automotive Engineers.

Long John's Wooden Leg. — How Georges Bank can supply the Dust Bowl's frying pans is a question depending in part on cowskins, nickel, fathometers, hardy men, and the absence of cologne, as RICHARD HALLET reports in an account of voyaging to the fishing grounds aboard a modern otter trawler (page 70). Australia before the World War and the Maine Coast in the dead of winter have earlier been recounted for The Review by Mr. Hallet, who as novelist and fictioneer is well known.

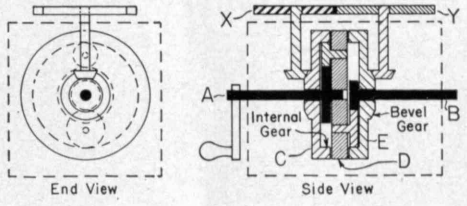
No. 29

Just for Fun!

A CHALLENGE

TO YOUR INGENUITY

THE gear train below can be made to meet last month's puzzle requirements — that there be a true drive connection between shafts *A* and *B* with gears *X*, *Y* as shown, but none with *X* and *Y* interchanged. [*A*, *B* are gear-ended shafts; *C*, *E* each carry internal and bevel gears; *D* carries



two planetary idler gears.] For a given set of gear ratios "inside the box," there is *only one* ratio *R* for *X*:*Y* which positively *connects** *A* and *B*. Find *R*. [What if *X* and *Y* are elliptical?]

*A simpler device *disconnects* for one *R* only.

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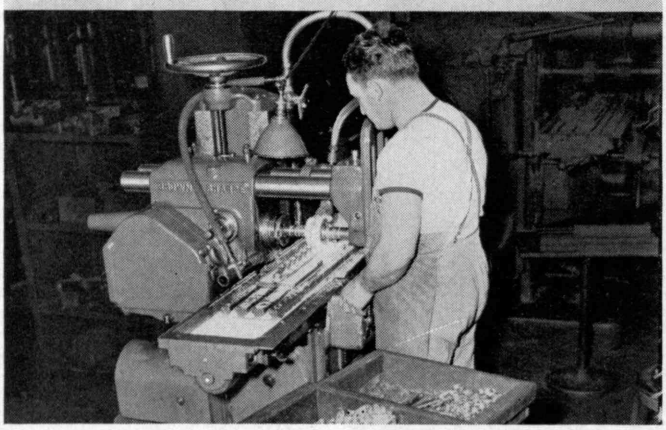


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MAIL RETURNS

"*The Layman's Science*"

FROM VANNEVAR BUSH, '16:

"The Layman's Science" in the November Review is a scholarly treatment of a difficult subject. I beg to differ on a couple of points, or perhaps merely to shift emphasis, in the attempt to round out my own thinking on a subject which has always interested me.

The article argues that if the interpretation does not show how the scientific matter treated relates to the personal affairs of the reader, the interpretation will not take. If personal affairs are understood as including the building of an individual cultural pattern and philosophy, I might agree. If by everyday affairs we mean merely food, clothing, shelter, and so on, then there should be no appeal in astronomy; but there certainly is. True, some phases of astronomy advance physics, which in turn does very practical things for us; but the other, the philosophical phase of astronomy, which by no stretch affects our physical ways of living, has had enormous popular appeal.

This is important. Whole areas of scientific effort can be interpreted as of only general cultural interest, for their whole aim is to broaden and clarify matters which are impractical. Archaeology, paleontology, astronomy, much of geology, part of many sciences, have proved to be of intense interest to many and could undoubtedly be of interest to many more if interpreted with complete skill. Such interpretation cannot be done by a writer who thinks the public is interested only in matters that affect it personally.

"The usual reader lacks not only the special training necessary to a comprehension of the immediate event but also an understanding of the sequence of previous developments which made that event possible. . . ." This thought also runs through the essay. I think it has been much overemphasized and that American science writers in general write down unduly. If the object is to write so that all can understand, the case is hopeless. Science can be effectively interpreted only for those who have more than the usual intelligence and innate curiosity. These will work hard if given a chance and if they find they acquire something by so doing. (Witness Eddington's *The Nature of the Physical World.*) The trouble is that, in the hands of the usual science writer, they seldom get the chance.

One more point: The urge to create, to do original thinking, or to make new things, is exceedingly strong in many individuals and much more widespread than is ordinarily appreciated. With this urge as an incentive, very large numbers of people will read carefully and often expositions of matters which to the scientist are commonplace — an example was the long series of articles on elementary physics when homemade radios were the vogue. This fact also has not been sufficiently realized by those who interpret. Of course this is not the only reason that people read articles on science; some, for example, read science as a "must" in the same way that they labor through the book of the month. I venture that if an analysis of reader demand could be made, the result would surprise us all. If writers think they are catering to an audience which wishes only to marvel at the spectacular or to have its everyday affairs enlarged upon, I believe they are reaching only a small fraction of their potential readers.

Washington, D. C.

Copia Verborum

FROM FRANK G. SMITH, '11:

Please bear in mind that I am not a literary critic, but I am so taken aback with reading "The Layman's Science" in the November Review that I must indulge in some good-humored raillery. I am always interested in reading The Review because it covers the news of the Institute very well. Altogether, it is a fine publication. "The Layman's Science," however, seems to me to fall far below the usual standard. The discussion is based on the difficulty of "translating" with reasonable accuracy the scientist's into the layman's language. The authors have used a style which is neither easy to read nor understand. Paragraphs are padded with long words which look important but almost need translating. They have fallen into the same pit with that scientist who cannot write his story in simple words. Their own story is difficult to read.

Did the editors make use of the reference to *Science* as quoted: "Science popularizers should write simply and clearly . . ."? Consider the first sentence of the third paragraph: "The question of adequate popularization becomes more difficult and more important as the material to be popularized increases in complexity or strangeness." Would it not be easier to read and (*Concluded on page 89*)



4140 GOES TO SEA

It is well for all concerned that builders of marine Diesels make performance capacity the primary basis for the selection of materials. Breakdowns at sea or anywhere else are no fun for anyone, including the engine builder.

But the demand for reliability can be met and production costs still kept where they should be. One prominent builder, for example, is doing both by specifying Chromium-Molybdenum (SAE 4140) steel for a number of parts including bolts, wrist-pins, cylinder head studs, gears, tappets and crankshafts.

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A "Rubber Railroad"

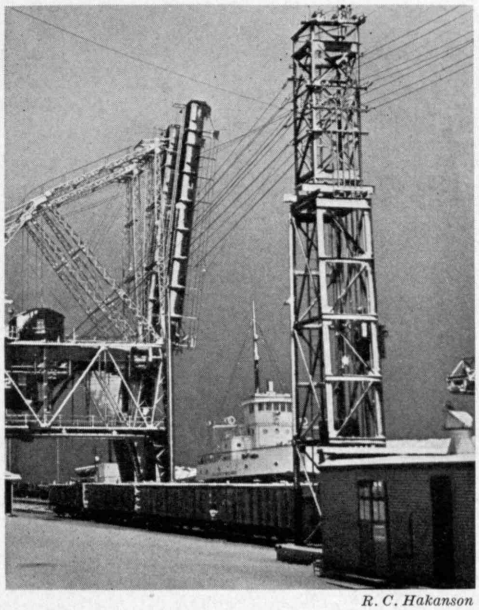
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At Conneaut, Ohio, on Lake Erie, of a winter's day

VOLUME 43 NUMBER 2

THE TECHNOLOGY REVIEW

TITLE REGISTERED U. S. PATENT OFFICE

EDITED

AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

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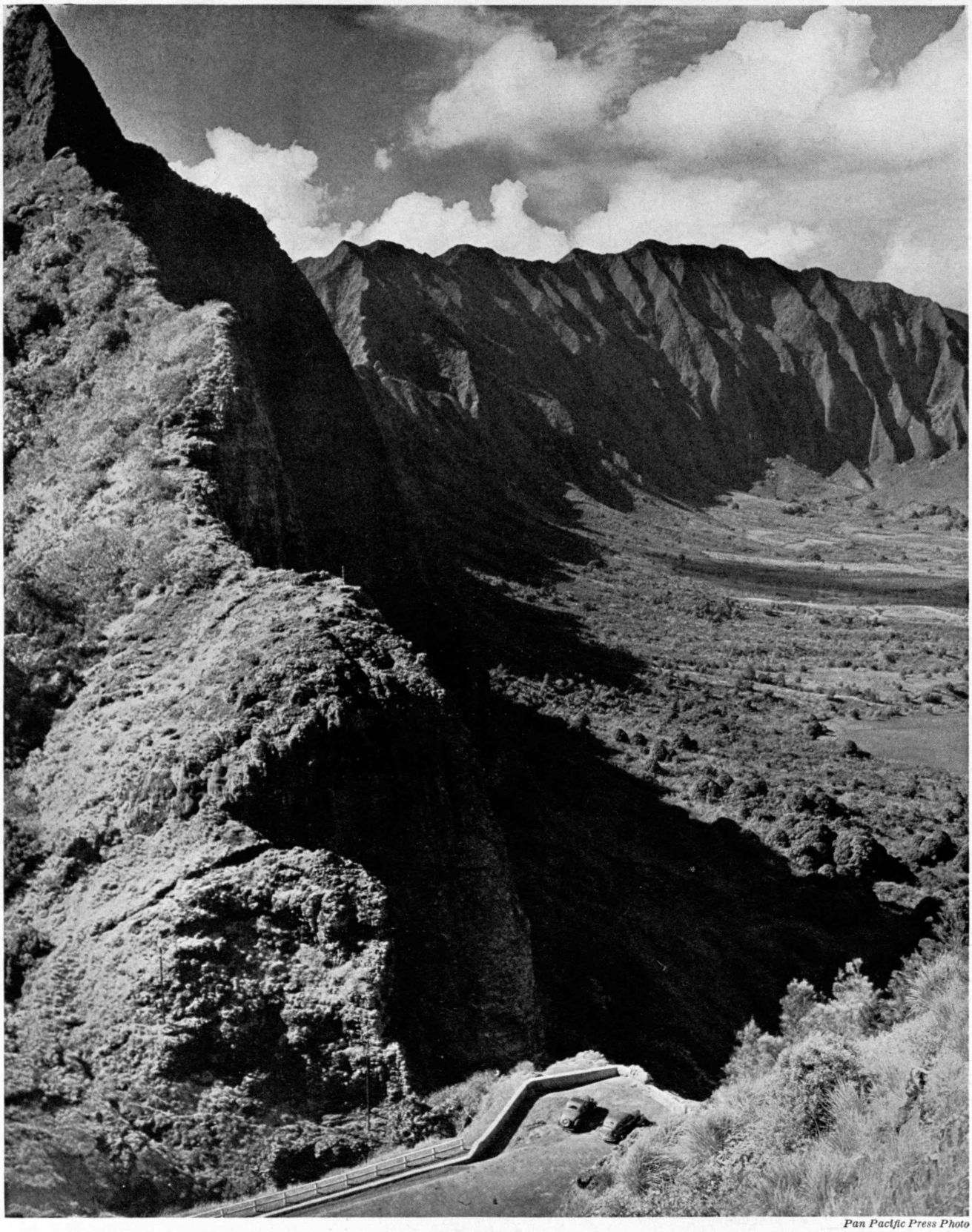
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AT HONOLULU

From this cliff, according to ancient Hawaiian legend, Kamehameha the Great, Hawaii's first monarch, had his enemies hurtled into the valley a thousand feet below.

THE
TECHNOLOGY REVIEW

Vol. 43, No. 2 December, 1940

The Trend of Affairs

Why Gertie Galloped

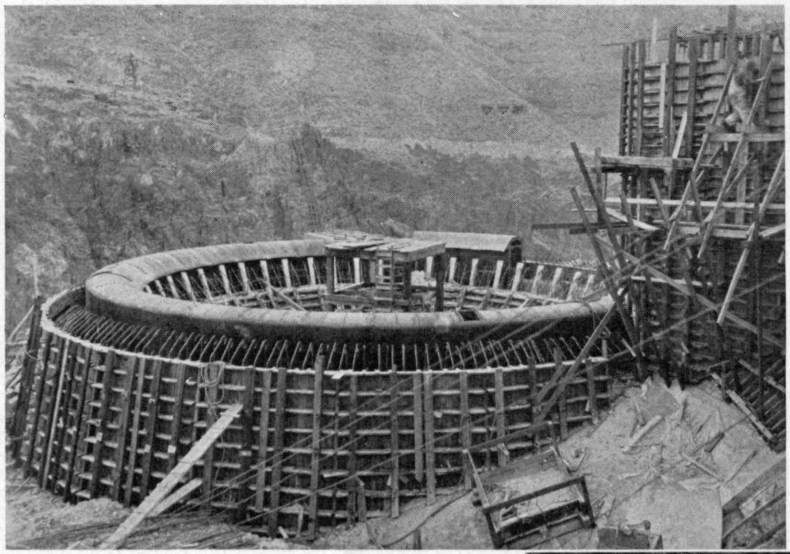
COLLAPSE of the Tacoma Narrows Bridge over Puget Sound at Tacoma, Wash., recently was starting point for various official inquiries from which engineering studies may be expected to result and to shed light eventually on the exact causes of failure. Nicknamed "Galloping Gertie" by residents of the region because of its tendency to sway exceedingly with the wind, the bridge had by its antics occasioned considerable speculation before it crashed 190 feet into the waters of the sound on November 7 in a 42-mile wind. Completed last July, it had the third longest center span in the world—2,800 feet—with two 1,100-foot side spans.

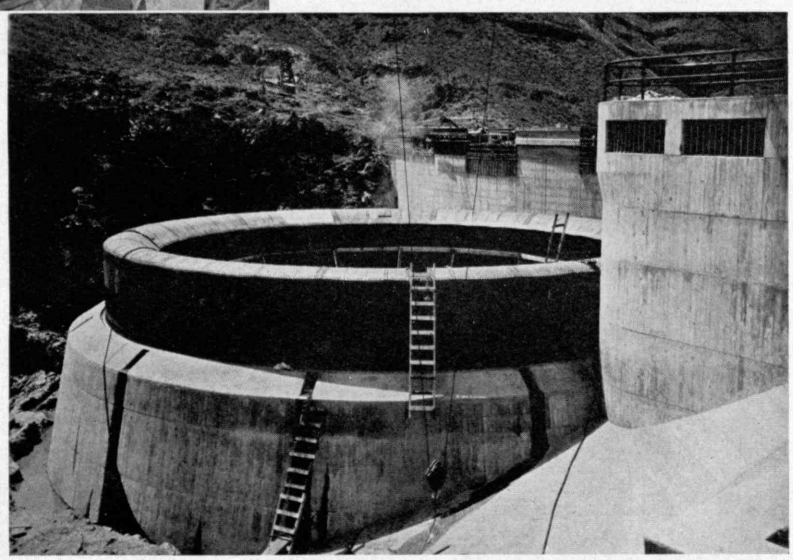
Careful study by vibration experts, correlated with observed behavior, motion pictures, and model tests, may be expected to clarify the question of why the bridge failed. The detailed considerations may well be underlaid by certain general conclusions. The vibration which led to the crash of the bridge seems generally agreed to have been caused by wind — an occurrence almost unprecedented for such bridges even though steady winds have long been known to produce destructive vibrations in other structures. Sleet-covered transmission lines, for example, have been observed to "gallop" through twenty-foot vertical distances under the influence of steady wind. Transmission-line strands have broken in fatigue from vibration caused by wind eddies on the leeward side of the wires. Airplane wings have broken off because of "flutter" occurring in power dives. All three of these causes of failure are well known in the special cases mentioned but seemed hardly to be expected in such massive structures as bridges. From tests of models and from observation and study of the bridge vibration itself, however, it appears evident that the vibration was actually a manifestation of one or more of these phenomena.

The Narrows Bridge differed from comparable suspension bridges principally in extremity of design, having a span-to-width ratio of seventy-two as compared to forty-eight for the Golden Gate Bridge. Instead of the more common stiffening trusses, large plate girders were used on the Narrows Bridge. Although in post-mortem these differences appear significant — hindsight always being easier than foresight — their possible importance in the Narrows Bridge could hardly have been anticipated in the light of previous experience.

Galloping and flutter have often been demonstrated on simple models. Having observed the Narrows Bridge at first hand during its months of annoying "bouncing," Blake Mills, '35, instructor in mechanical engineering at the Institute, has by means of a model illustrated a phenomenon something akin to transmission-line galloping as a possible cause of the vibration. In a small wooden model of a stiffening girder, supported on springs and placed in the air stream of a fan, a rather violent and continuous gallop is readily built up. This model is similar to one devised by Professor J. P. Den Hartog of Harvard to illustrate galloping of other types of member. A flat wooden slab, substituted for the girder model in the air stream, readily flutters violently with a combined bouncing and rolling motion somewhat similar to the photographed motion of the deck of the Narrows Bridge just before failure. No model has been built by Mr. Mills to show vibration caused by wind eddies, but a common example of this phenomenon is offered by telephone wires which "sing" in the wind.

Recognition in the Tacoma Narrows Bridge of any or all of these three types of wind-excited vibration by no means leads to a direct solution of the problem of failure. It may serve a purpose, however, in pointing out that on a structure designed for steady loads, dynamic load may in some cases be produced by steady wind. Violent vibrations hence can result from perfectly steady winds,





The glory-hole spillway at Owyhee Dam in Oregon is a vertical shaft of the record height of 309 feet, which diverts waste water to a tunnel passing far under the base of the dam and discharging into the river. At the crest the glory hole is 60 feet in diameter. The single ring gate controlling the full circle of the crest is the first of its kind. Above: *crest during construction.* Right: *ring gate in raised position during test.*

and there are evidently situations where structural designs must reckon with this fact.

Science in War

IN every independent nation of the world which indulges in higher education, scientists are today working against time — a few seeking impregnable means of defense, many more looking for invincible methods of attack. These men would be less than human if they did not in some measure enjoy their task, yet according to the writing of scientific pundits for more years than one can count, it is contrary to all that science stands for.

American men of science have come so recently to the mill that as yet they have done little more than help purposefully to turn the stones. In Britain, on the other hand, this affair has been going on for considerable time; some scientists have stopped to take stock, and have written about their stocktaking in a book, *Science in War*,* now available in America.

The discussion is entertaining and instructive. For the most part it deals with what science might have been able to do and might still be able to do for Britain in her current war. After an introduction, to which reference may more profitably be made later, the text begins with familiar illustrations from the past, such as Leblanc's invention, in 1787, of a new method for making soda. From today's events, authors choose the tale of the magnetic mine and its defeat through the process of degaussing ships. An extensive section on the airplane contains the suggestion that science might have quite as many useful things to say about air-combat tactics as it does about flight characteristics.

Some of the most vigorous pages are from the notes of an officer in the recent Spanish campaign and describe efforts to defeat the tank. These efforts were a sort of large-scale field study, employing the method of try and fail, though the ending is reported to have been happy. From this experience the authors conclude that research might have saved a great deal of time, in fact might have solved the problem in three months. They point out that empirical tests in battle may not give results until a war is lost. This section ends on a pessimistic note: "Indeed, those who despair of getting things done, might well wonder if the empirical research carried out by the Spaniards will not prove to have been far more rapid and effective than anything that will be possible with the war machine of our country — dominated as it is by an apparently unscientific war-office hierarchy."

For medical science the book has a better word to say, describing with enthusiasm several relatively new ideas — the use of Epicutan from the juice of half-incubated chicks to stimulate cell growth; the employment of vitamins in healing; the possibilities in chemotherapy in caring for wound infections, such as those of streptococcus, which are hard to treat by serum therapy; the plaster-sealed treatments of the Spanish campaign; and, for transfusions, typed bloods preserved in bottles. The principal recommendation in this section is for more research on shock.

It is a bit of a surprise, but only at first glance, to find so much of the book devoted to food. Much is said about Britain's failure to cultivate her own lands scientifically; a strong plea is entered for a serious study of insect pests, which even in ordinary times destroy one-tenth to one-fifth of all the vegetable crop from British farms; a delightful section deals with the modes of British stock

* Harmondsworth, Eng., and New York: Penguin Books, 1940. 140 pages, 25 cents. The authors are anonymous, but the ideas indicate that their names, if known, would command respect.

selection, which is based primarily on how well the single animal will show on points. The established principles of genetics are, it appears, largely ignored, or at any rate those desirable for breeding race horses are imposed on the breeding of pigs, cattle, and sheep. Speaking of the pig, the authors remark that "the colour of the ears has often been more important than the capacity to suckle the young." The discussion of food supply ends with a proposal that a blueprint be drawn up for national communal feeding, although the authors recognize that "tampering with feeding habits is one of the surest ways of arousing public resentment. . . ."

From all this, it will be realized that here is a book jam-packed with ideas which will warrant reading by any thoughtful man. So far as the book is a program for what might have been, or even a program for what might be, it is reasonably satisfactory. But the authors have a further and deeper purpose. They propose to show why such a program was not in force and to explain how it may in the future be in force.

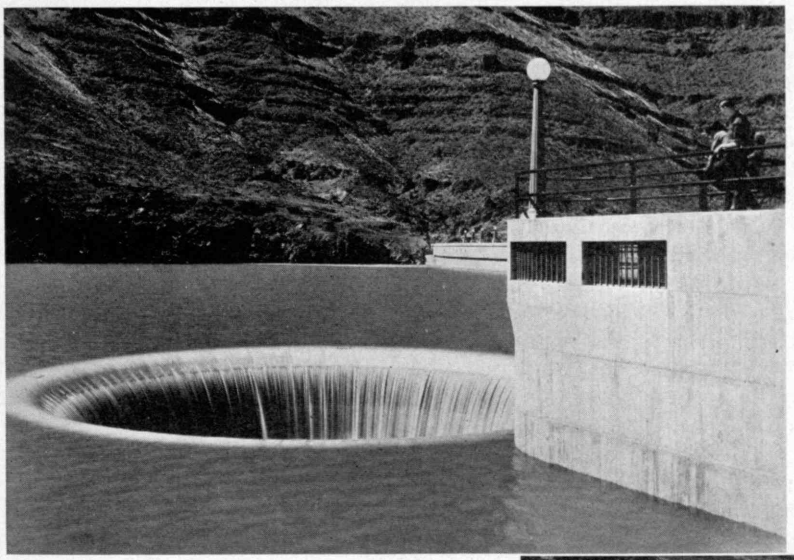
The introduction urges, again, that science "does not stand outside the ordinary ways of acting and thinking" but is merely the most orderly of these ways, and that therefore science is more needed now than in the past. Much is made of the fact that it is not enough for science to solve problems now seen to exist; not enough to follow established and traditional methods of thought and action. Accordingly, the plea is made that science be permitted to survey the whole field of war, including the domain of military tactics, instead of being limited to the pedestrian roles of unstopping bottlenecks in industry or of devising improvements to accepted military devices.

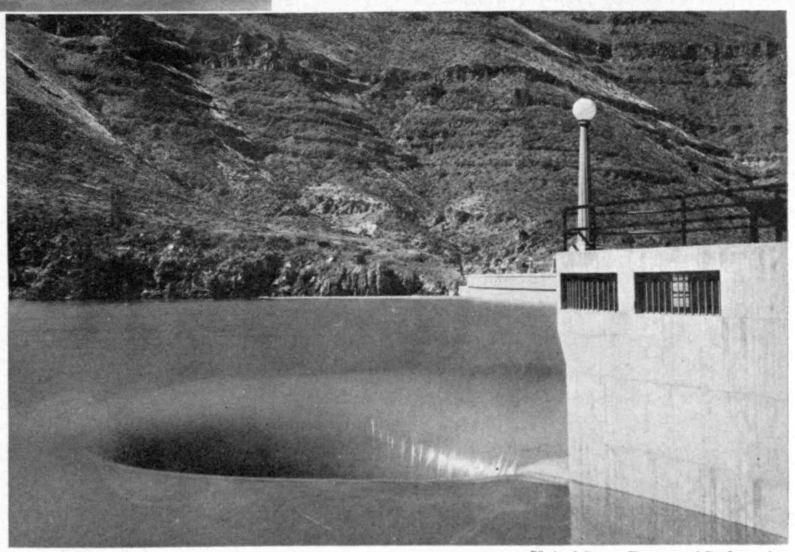
As reasons why science has not been permitted to do so, the authors offer that commercial organizations are too secretive; administrative officers are dominated by technical advisers who are cut off from the more active stream of scientific thought; civil servants lack initiative; business and government tend to regard scientists merely as consultants; centrally located advisory scientists tend to become yes men; scientists are excluded from discussions on policy and especially from making decisions. It is stated that "a general and organized scientific approach to the problems of national existence is foreign to the tradition of both the economic and political management of this country."

The writers of the book have no intention of letting matters rest with propounding the dilemma; they set out to resolve it. Their resolution, too, follows familiar lines. It starts by stating that until recently not a single working scientist was a member of the House of Commons. Apparently this lack was a bad thing. But in the next breath the writers remark: "And on those rare occasions when a scientist has joined the Cabinet or the higher ranks of administration, he has generally left scientific modes of action outside the door of the Cabinet room, and has vied with the rest in Platonic methods of ascertaining truth." Confusion seems to exist here between using the scientific method in society and having scientists as the people who run society.

The solution for all these difficulties lies, according to the writers, in better publicity. If science, and especially scientists, only be known to the public, scientists will perforce be placed at the head of things, and by an equally violent *non sequitur* they will of course shortly put things to rights. One might have a science service; one might have an association of scientific writers, as in America; one might increase the number of good scientific articles in the press; one might distribute scientific films; above all, one might use the B.B.C.

That the excellent preparatory material leaves the reader on such an anticlimax is a great pity. For the conclusions really suggest the addition of two quotations. From Phaedrus, Plutarch, and Horace we might





Above: *radially converging flow of a thin film of water being discharged over ring-gate crest.* Right: *Starting on its 300-foot plunge, a flow 2½ feet deep is glassy smooth.*

United States Bureau of Reclamation

draw the reference to the labor of the mountain. And when the mouse inevitably comes out, we might add with Omar that he came out the same door through which in he went. This is very much too bad, for despite the disappointment of their conclusions, these scientists have clearly defined the issues that must be met and have supplied able summary of both deeds and aims.

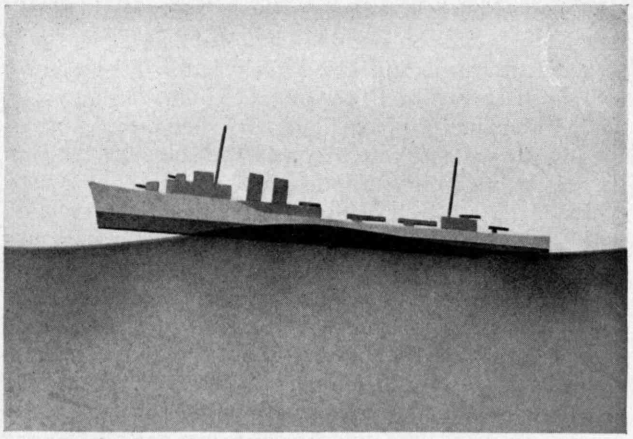
Industrial Vitamins

SHARP increases in the prices of diamonds since the start of the war — significantly, several times as much for industrial diamonds as for the bigger and more nearly perfect jewelers' stones — draw attention to a class of materials which are irreplaceable in a mass-production economy as we know it, but which are used in such comparatively small amounts and to such large effect that they may be likened to vitamins in biological processes. These are the extremely hard materials, such as aluminum oxide, the cemented carbides, and high-speed steels, which grind, cut, draw, and hammer the products of industry into shape. Without them the jobs might somehow be done, but not with the speed and efficiency that give industry its vitality. Mass production depends on interchangeability, which depends on split-hair accuracy, which, in turn, can be obtained at what we now consider reasonable costs only by the use of these keen-edged, heat- and wear-resisting tools.

In 1939, a top year, the world produced about two and a half tons of diamonds, of which over one-half went into industry. In 1936 the entire world output of cemented carbides was in the order of fifty tons. Like diamonds, however, the material is spread thin; it is estimated that every pound of cemented metal carbides is fashioned into an average of ninety parts. Synthetic abrasives, mainly silicon carbide and aluminum oxide, make a more impressive showing, the production in the United States and Canada running to about 100,000 tons a year; yet this figure still represents a minute fraction of the metals, minerals, and plastics which are processed by synthetic abrasives.

The effect of the superhard materials on production is indicated by the reaction of *The Engineer* (London) for September 7, 1900, which noted with astonishment that the newly invented high-speed steel of Taylor and White worked as well when red hot as when cold. "The average quantity of metal removed per hour" [in the shops of the Bethlehem Steel Company], it adds, "has augmented from 31·18 lb. to 137·3 lb., . . . a gain of . . . 340 per cent." From a greater perspective, C. C. Furnas says in a report of the National Resources Committee: "This introduction of one simple improvement [high-speed tool steel] so changed the industrial picture in this country that the efficiency of all industries underwent an estimated increase of 15 per cent. . . . about 8 billion dollars per year."

The high-speed steels, usually containing tungsten, chromium, and vanadium, hold most of their hardness up to temperatures as high as 950 degrees Fahrenheit, whereas alloys composed solely of cobalt, chromium, and tungsten maintain excellent properties up to about 1100 degrees Fahrenheit. The spectacular performances of both when made into dies, cutting tools, and wear-resisting parts arise in large measure from their content of extremely hard and stable metal carbides. To obtain fullest advantage from these remarkable compounds, tools and machine parts are now made which consist only of tungsten, tantalum, and titanium carbide particles cemented together with as little as 3 per cent of cobalt. Specimens of cemented carbides have registered the record moduli of elasticity and compressive strength.



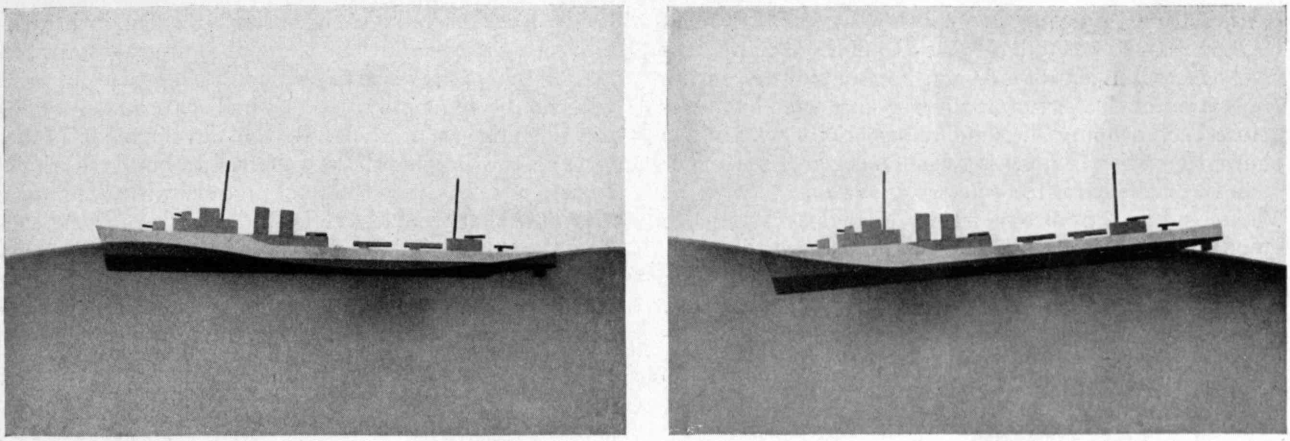
Given a certain vessel, given a certain wave . . .

Because the carbides are harder than any metals, therefore incapable of being fabricated by any machining operations except grinding, and are about as hard as the commonly used abrasives, they must be finish-ground on diamond-impregnated wheels. The diamond is not new to industry, having long been used for truing grinding wheels of the next hardest substances — boron carbide, silicon carbide, and aluminum oxide — and for cutting nonferrous metals and plastics, to which it gives surfaces unsurpassed for smoothness and accuracy. But the importance of the diamond has naturally increased with the rise of the cemented metal carbides. Incidentally, the best industrial diamonds are not the clear, glittering variety but the black stones of Brazil, whose many tiny crystals arranged at random give maximum insurance against cleavage. Likewise, the small crystals which are all that can be produced synthetically at the moment are well suited for industrial use.

These hard materials are hard because of the strength with which their individual atoms are held in their crystal lattices. Almost without exception, therefore, materials of extreme hardness also have very great chemical stability, high melting points, and excellent resistance to corrosion. Where costs allow, and they do with the synthetic abrasives, such materials perform outstandingly as refractories and in chemical apparatus. Thus, by the grace of Edward G. Acheson and his successors, we have the spectacle of aluminum oxide, the stuff of which rubies and sapphires are made, being used to line glass furnaces.

Sailing Synthetic Seas

SEAFARERS who have stood well forward on the deck of a vessel bucking a head sea can easily recall her strange motion — a mysterious combination of dogged forward drive, sudden swift downward drop,



. . . this is the heaving and pitching that will result, as calculated by use of the cinema integraph.

apparent indecisive halt, slow shuddering upward rise, then forward drive again, and the whole cycle repeated. The motion of a ship in such a sea is a complicated thing, and naturally enough the stresses set up in the complex fabric of the vessel are the intricate result of multifarious and involved factors. Knowledge of the pitching and heaving motion of a vessel in such circumstances may contribute significantly to the design of ships, permitting, for example, a better estimate of hull stresses, of necessary freeboard, and of other considerations contributing to seaworthiness and safety. The computation of both the motion and the consequent stresses is obviously a very arduous task.

Devotees of Rudyard Kipling who know his story of "The Ship That Found Herself" are familiar with what may be called the poetic determination of what happens to a ship in a seaway. The beams, plates, and rivets of Kipling's vessel — endowed by him with life and personality — learn during their first voyage the secret of coöperation, so that the vessel herself takes on individuality. Mathematical prediction of what may happen to a ship in such circumstances has in the past been forced to rely upon too ideal assumptions and has been handicapped by computational limitations. A speedier way of getting at figures both for the heaving and pitching motions of a ship in a seaway and for the shearing and bending stresses resulting from them in the hull could be expected so to reduce the time cost that such calculations may become practicable in routine design.

Such a method is suggested by results that have been secured in application of the cinema integraph to this problem in the laboratories of the Department of Electrical Engineering at Technology. Professor Harold L. Hazen, '24, Head of that Department, who with Gordon S. Brown, '31, Assistant Professor of Electrical Engineering, built the cinema integraph under the supervision of Vannevar Bush, '16, has recently, with Paul T. Nims, '40, reported to the Society of Naval Architects and Marine Engineers a trial calculation, using the machine to reckon the pitching and heaving motion of a ship in a head sea, after which the resultant stresses were readily evaluated.

Readers of The Review will recall, from the account of the cinema integraph in our issue for November, 1939 (page 10), that the machine secures its results essentially by the measurement of quantities of light which represent variables in the problem under consideration. Sections of motion picture film are masked off in such a way that the transparent portion remaining represents one variable. Similar arrangements are made for the second variable. Light passed through these transparent portions is collected in a hollow sphere and actuates a photocell which in turn actuates recording mechanisms.

In the ship problem, one film was made to represent a wave of standard trochoidal form, 401.5 feet long and 20 feet high from trough to crest. The frames of the second film carried sections of the hull of a destroyer of 2,100 tons' displacement, 365 feet in length. With a given hull frame and a given wave frame in line, the amount of light transmitted causes an automatic registration of the buoyant force of the wave at a given point on the hull. Working rapidly from point to point in this fashion, the machine computes the buoyant force on the entire ship for a given moment of time. A series of these calculations for succeeding moments permit determination of the ship's motion. Stresses then are determined, including the effect of the motion already figured.

This investigation was experimental in that it was aimed at finding out the technique of applying the cinema integraph in a new kind of work. Initial assumptions concerning the ship were therefore somewhat broad. This study involved but one type of vessel, one set of conditions of loading, and a series of but one type of wave — circumstances absurdly simple as compared with those of a real ship in a real sea. It served, however, to demonstrate that the cinema integraph offers promise for more rapid performance of standard or routine calculations and, more challenging, for extension of analytical as against empirical methods in design.

The calculated motions of the hypothetical destroyer used in this investigation provided data for an animated-cartoon moving picture showing the ship in a seaway. From this the illustrations above are taken.

On Grandpa's Knob

AN experimental development of no little interest is scheduled soon to be under way atop Grandpa's Knob, a peak on a Green Mountain ridge near Hubbardton, Vt. There, incorporating studies that have

extended over the past five years, a Gargantuan wind turbine is to be erected, designed to find out how effectively New England winds can be put to work in the generation of electricity on a larger scale than has heretofore been attempted. Meteorological observation has shown the region to possess a wind-energy regime higher than the average for the country as a whole. The Great Plains and various marine islands have been found also to offer suitable locations for such installations.

A tower over 100 feet high will carry the wind turbine, whose function is to drive a 1,000-kilowatt generator. The turbine's stainless-steel blades, which resemble airplane wings, have a wing spread about as great as that of a large modern bombing plane. Centrifugal forces on the turbine hub are of course enormous and have offered unusual problems in structural design. Accurate regulation of the speed of the generating unit has presented another interesting difficulty; without such regulation, wind gusts would raise the output from 1,000 to 3,000 kilowatts in less than three seconds, seriously overloading the generator. The uncertainties necessarily present in testing a new development of such magnitude include questions like that of the possibility that ice in large fragments will be thrown from the blades during their rotation. These considerations have led to a decision to run the test unit by remote control from a stout dugout in the near-by rock, a station which, in the ruggedness of its construction, will resemble a bombproof shelter.

Daily wind-gauge readings during an extended period as well as many other tests at points throughout the Green Mountain region have provided data used during design of the test turbine. A second tower nearly 200 feet high will be built at the experimental site to carry meters measuring air flow. These meters will make possible an extended investigation of gust velocities and gradients on mountaintops. The turbine is not intended to supplant existing sources of supply. The wind station can increase the value of existing generating sources by backing them up with predictable wind power, and they in turn can complement the wind station when it is becalmed. The worth of wind power, it is felt, might be further extended through use of it to supply energy for electrochemical and other operations which do not require continuous supply. Hence wide industrial applications are seen for wind-generated electricity once its low-cost availability has been demonstrated.

From an industrial engineering standpoint, the project is interesting not only because of the relatively large investment necessitated even during the pioneering stages. For one thing, it is unusual for a test installation of such size to be made at full scale outright, with no intermediate stage of small-scale model testing for the unit as a whole. In the development of the turbine, the designers have preferred to build additional factors of safety into the final product with the money and time that would have been demanded for the construction of a suitable small-scale test device. The unit is so involved that a small model, comparatively speaking, would have been very costly as an engineering undertaking, and hence the differential in cost between full scale and small scale was not so great. Uncertainties in the extrapolation of data from small-scale tests were another factor in the decision to go direct from blueprints to full-size construction. Extensive wind-tunnel testing was of course done during preliminary aerodynamic studies.

The project is somewhat out of the usual likewise in the wide range of scientific and engineering information upon which it has drawn, including the work of investigators widely separated throughout the country, among them many Alumni and staff members of the Institute. The turbine itself is from the designs of Palmer Cosslett Putnam, '23, project engineer for the undertaking. Chief engineer of the project and general structural consultant is John B. Wilbur, '26, Associate Professor of Civil Engineering at Technology. Meteorological studies are under the charge of Sverre Petterssen, Professor of Meteorology at Technology.

Joseph S. Newell, '19, Professor of Aeronautical Structural Engineering at the Institute, was consultant on the design of the blades. Theodore von Kármán, director of the Daniel Guggenheim aeronautical laboratory at the California Institute of Technology, is in charge of aerodynamics in connection with the undertaking. John F. Haines, '34, has served as consultant on aerodynamic and mechanical problems. On the meteorological front C.-G. A. Rossby, assistant director in charge of research of the United States Weather Bureau; Charles F. Brooks, director of Harvard University's Blue Hill Observatory; Hurd C. Willett, Associate Professor of Meteorology at the Institute; and Karl O. Lange of the Blue Hill staff have been consultants. Other Institute people active in the development are Charles H. Norris, Jr., '31, Frederick G. Lehman, '39, and Myle J. Holley, Jr., '39, of the Department of Civil Engineering; Walter

(*Concluded on page 91*)



Robert H. Smyth, '28

Textures and shadows in a pile of future paper

Linguistics as an Exact Science

New Ways of Thinking, Hence of Talking, about Facts Vastly Alter the World of Science, Emphasizing the Need for Investigation of Language

By Benjamin Lee Whorf

THE revolutionary changes that have occurred since 1890 in the world of science — especially in physics but also in chemistry, biology, and the sciences of man — have been due not so much to new facts as to new ways of thinking about facts. The new facts themselves of course have been many and weighty; but more important still, the realms of research where they appear — relativity, quantum theory, electronics, catalysis, colloid chemistry, theory of the gene, Gestalt psychology, psychoanalysis, unbiased cultural anthropology, and so on — have been marked to an unprecedented degree by radically new concepts, by a failure to fit the world view that passed unchallenged in the great classical period of science, and by a groping for explanations, reconciliations, and restatements.

I say new ways of *thinking* about facts, but a more nearly accurate statement would say new ways of *talking* about facts. It is this *use of language upon data* that is central to scientific progress. Of course, we have to free ourselves from that vague innuendo of inferiority which clings about the word "talk," as in the phrase "just talk"; that false opposition which the English-speaking world likes to fancy between talk and action. There is no need to apologize for speech, the most human of all actions. The beasts may think, but they do not talk. "Talk" *ought to be* a more noble and dignified word than "think." Also we must face the fact that science begins and ends in talk; this is the reverse of anything ignoble. Such words as "analyze," "compare," "deduce," "reason," "infer," "postulate," "theorize," "test," and "demonstrate," mean that whenever a scientist does something, he talks about this thing that he does. As Leonard Bloomfield has shown, scientific research begins with a set of sentences which point the way to certain observations and experiments, the results of which do not become fully scientific until they have been turned back into language, yielding again a set of sentences which then become the basis of further exploration into the unknown. This scientific use of language is subject to the principles or the laws of the science that studies all speech — linguistics.

As I was concerned to point out in a previous article, "Science and Linguistics," in The Review for April, we all hold an illusion about talking, an illusion that talking is quite untrammeled and spontaneous and merely "expresses" whatever we wish to have it express. This illusory appearance results from the fact that the obligatory phenomena within the apparently free flow of talk are so completely autocratic that speaker and listener are bound unconsciously as though in the grip of a law of nature. The phenomena of language are background phenomena, of which the talkers are unaware or, at the most, very dimly aware — as they are of the motes of dust in the air of a room, though the linguistic phenomena govern the talkers more as gravitation than as dust would. These automatic, involuntary patterns of language are not the same for all men but are specific for each language and constitute the formalized side of the language, or its "grammar" — a term that includes much more than the grammar we learned in the textbooks of our school days.

From this fact proceeds what I have called the "linguistic relativity principle," which means, in informal terms, that users of markedly different grammars are pointed by their grammars toward different types of observations and different evaluations of externally similar acts of observation, and hence are not equivalent as observers but must arrive at somewhat different views of the world. (A more formal statement of this point appears in my article of last April.) From each such unformulated and naïve world view, an explicit scientific world view may arise by a higher specialization of the same basic grammatical patterns that fathered the naïve and implicit view. Thus the world view of modern science arises by higher specialization of the basic grammar of the western Indo-European languages. Science of course was not *caused* by this grammar; it was simply colored by it. It appeared in this group of languages because of a train of historical events that stimulated commerce, measurement, manufacture, and technical invention in a quarter of the world where these languages were dominant.

The participants in a given world view are not aware of the idiomatic nature of the channels in which their talking and thinking run, and are perfectly satisfied with them, regarding them as logical inevitables. But take an outsider, a person accustomed to widely different language and culture, or even a scientist of a later era using somewhat different language of the same basic type, and not all that seems logical and inevitable to the participants in the given world view seems so to him. The reasons that officially pass current may strike him as consisting chiefly of highly idiomatic *façons de parler*. Consider the answers that were at one time given even by learned men to questions about nature: Why does water rise in a pump? Because nature abhors a vacuum. Why does water quench fire? Because water is wet or because the fiery principle and the watery principle are antithetical. Why do flames rise? Because of the lightness of the element fire. Why can one lift a stone with a

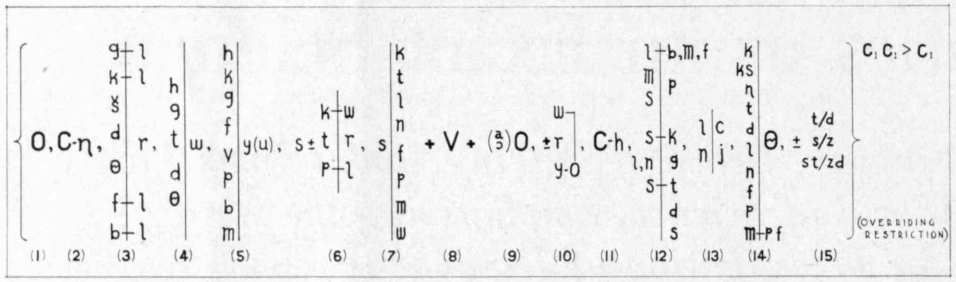


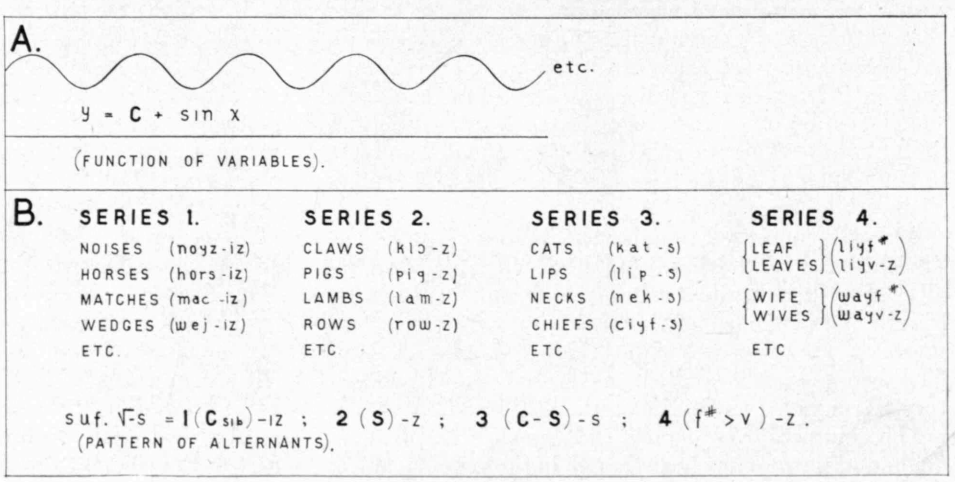
Fig. 1. Structural formula of the monosyllabic word in English (standard midwestern American). The formula can be simplified by special symbols for certain groups of letters, but this simplification would make it harder to explain. The simplest possible formula for a monosyllabic word is C+V, *and some languages actually conform to this. Polynesian has the next most simple formula,* O, C+V. *Contrast this with the intricacy of English word structure, as shown above.*

leather sucker? Because the suction draws the stone up. Why does a moth fly toward a light? Because the moth is curious or because light attracts it. If once these sentences seemed satisfying logic but today seem idiosyncrasies of a peculiar jargon, the change is not because science has discovered new facts. Science has adopted new linguistic formulations of the old facts, and now that we have become at home in the new dialect, certain traits of the old one are no longer binding upon us.

We moderns are not yet in a position to poke fun at the wiseacres of old who explained various properties of water by its wetness. The terminology which we apply to language and cultural phenomena is often of a piece with the wetness of water and nature's abhorrence of a vacuum. The researches of linguists into the ways of languages many and diverse are needed if we are to think straight and escape the errors which unconscious acceptance of our language background otherwise engenders. An increasing contribution from linguistics to the general philosophy of science is demanded by the new ways of thinking implied by those new realms of science cited at the beginning of this essay. It is needed for science's next great march into the unknown.

The situation is not likely to be aided by the philosophical and mathematical analyst who may try to exploit the field of higher linguistic symbolism with little knowledge of linguistics itself. Unfortunately the essays of most modern writers in this field suffer from this lack of apprenticeship training. To strive at higher mathematical formulas for linguistic meaning while knowing nothing correctly of the shirt-sleeve rudiments of language is to court disaster. Physics does not begin with atomic structures and cosmic rays, but with motions of ordinary gross physical objects and symbolic (mathematical) expressions for these movements. Linguistics likewise does not begin with meaning nor with the structure of logical propositions, but with the obligatory patterns made by the gross audible sounds of a given language and with certain symbolic expressions of its own for these patterns. Out of these relatively simple terms dealing with gross sound patterning are evolved the higher analytical procedures of the science, just as out of the simple experiments and mathematics concerning falling and sliding blocks of wood is evolved all the higher mathematics of physics up into quantum theory. Even the facts of sound patterning are none too simple. But they illustrate the unconscious, obligatory, background phenomena of talking as nothing else can.

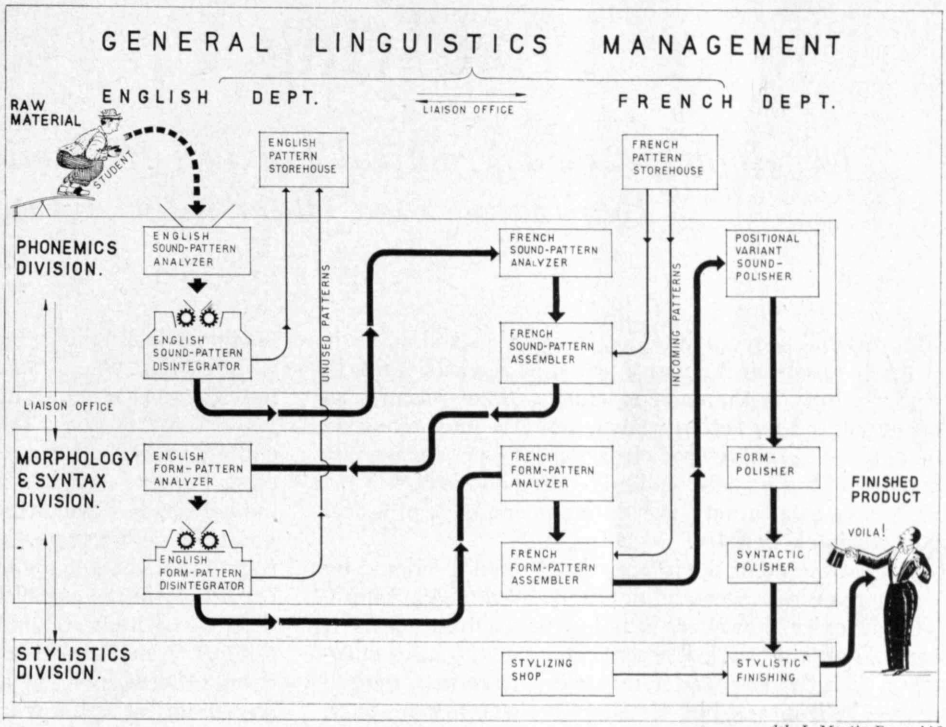
For instance, the structural formula for words of one syllable in the English language (Fig. 1) looks rather complicated; yet for a linguistic pattern it is rather simple. In the English-speaking world, every child between the ages of two and five is engaged in learning the pattern expressed by this formula, among many other formulas. By the time the child is six, the formula has become ingrained and automatic; even the little nonsense words the child makes up conform to it, exploring its possibilities but venturing not a jot beyond them. At an early age the formula becomes for the child what it is for the adult; no sequence of sounds that deviates from it can even be articulated without the greatest difficulty. New words like "blurb," nonsense words like Lewis Carroll's "mome raths," combinations intended to suggest languages of savages or animal cries, like "glub" and "squonk" — all come out of the mold of this formula. When the youth begins to learn a foreign language, he unconsciously tries to construct the syllables according to this formula. Of course it won't work; the foreign words are built to a formula of their own.



Variables and alternants: A *shows by graph and by mathematical formula (equation) an interrelation of variables.* B *illustrates by extensible examples and by a pattern formula an interrelation of alternants. The formula means that the English suffix which is theoretically ("by root," √) a final* s *is actualized in any given case by one of four alternants: after a sibilant-ending consonant, by* -iz; *after any sonant (vowel or consonant), by* -z; *after any voiceless (nonsonant) consonant by* -s; *except that after the special alternant* f#, *it is actualized by* -z, *the* f# *alternating to* v.

Usually the student has a terrible time. Not even knowing that a formula is back of all the trouble, he thinks his difficulty is his own fault. The frustrations and inhibitions thus set up at the start constantly block his attempts to use foreign tongues. Or else he even *hears* by the formula, so that the English combinations that he makes sound to him like real French, for instance. Then he suffers less inhibition and may become what is called a "fluent" speaker of French — bad French!

If, however, he is so fortunate as to have his elementary French taught by a theoretic linguist, he first has the patterns of the English formula explained in such a way that they become semiconscious, with the result that they lose the binding power over him which custom has given them, though they remain automatic as far as English is concerned. Then he acquires the French patterns without inner opposition, and the time for attaining command of the language is cut to a fraction (see Fig. 2). To be sure, probably no elementary French is ever taught in this way — at least not in public institutions. Years of time and millions of dollars' worth of wasted educational effort could be saved by the adoption of such methods, but men with the grounding in theoretic linguistics are as yet far too few and are chiefly in the higher institutions.



del. J. Martin Rosse, '40

Fig. 2. Flow sheet of improved process for learning French without tears. Guaranteed: no bottlenecks in production.

Let us examine the formula for the English monosyllabic word. It looks mathematical, but it isn't. It is an expression of pattern symbolics, an analytical method that grows out of linguistics and bears to linguistics a relation not unlike that of higher mathematics to physics. With such pattern formulas various operations can be performed, just as mathematical expressions can be added, multiplied, and otherwise operated with; only the operations here are not addition, multiplication, and so on, but are meanings that apply to linguistic contexts. From these operations conclusions can be drawn and experimental attacks directed intelligently at the really crucial points in the welter of data presented by the language under investigation. Usually the linguist does not need to manipulate the formulas on paper but simply performs the symbolic operations in his mind and then says: "The paradigm of Class A verbs can't have been reported right by the previous investigator"; or "Well, well, this language must have alternating stresses, though I couldn't hear them at first"; or "Funny, but *d* and *l* must be variants of the same sound in this language," and so on. Then he investigates by experimenting on a native informant and finds that the conclusion is justified. Pattern-symbolic expressions are exact, as mathematics is, but are not quantitative. They do not refer ultimately to number and dimension, as mathematics does, but to pattern and structure. Nor are they to be confused with theory of groups or with symbolic logic, though they may be in some ways akin.

Returning to the formula, the simplest part of it is the eighth term (the terms are numbered underneath), consisting of a *V* between plus signs. This means that every English word contains a vowel (not true of all languages). As the *V* is unqualified by other symbols, any one of the English vowels can occur in the monosyllabic word (not true of all syllables of the polysyllabic English word). Next we turn to the first term, which is a zero and which means that the vowel may be preceded by nothing; the word may begin with a vowel — a structure impossible in many languages. The commas between the terms mean "or." The second term is *C* minus a long-tailed *n*. This means that a word can begin with any single English consonant except one — the one linguists designate by a long-tailed *n*, which is the sound we commonly write *ng*, as in "hang." This *ng* sound is common at the ends of English words but never occurs at the beginnings. In many languages, such as Hopi, Eskimo, or Samoan, it is a common beginning for a word. Our patterns set up a terrific resistance to articulation of these foreign words beginning with *ng*, but as soon as the mechanism of producing *ng* has been explained and we learn that our inability has been due to a habitual pattern, we can place the *ng* wherever we will and can pronounce these words with the greatest of ease. The letters in the formula thus are not always equivalent to the letters by which we express our words in ordinary spelling but are unequivocal symbols such as a linguist would assign to the sounds in a regular and scientific system of spelling. (*Continued on page 80*)

Flying Up

Development of a Practical Inexpensive Helicopter Would Realize an Idea Older than Aviation

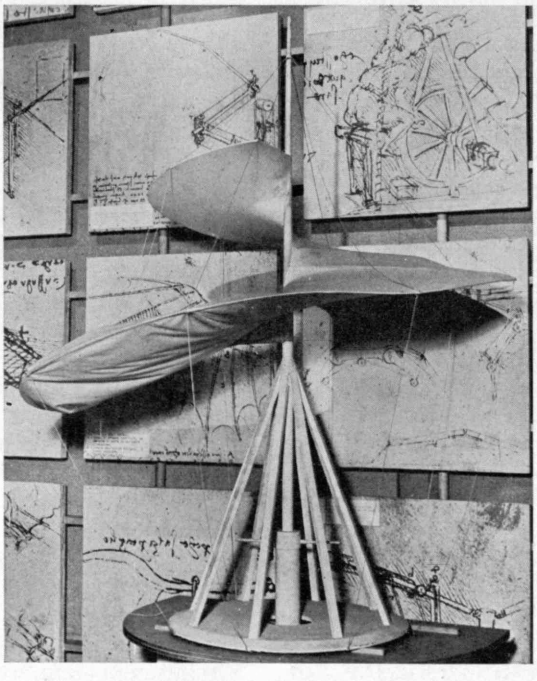
By S. Paul Johnston

MOST provocative idea in aviation today, as it has been for many years, is vertical flight in heavier-than-air machines. The picture so often painted by fiction writers and the quasi-scientific magazines — that every citizen may own an aircraft capable of taking off from and landing on his back yard or roof — awaits only the development of a practical inexpensive helicopter.

At least some of the interest has been engendered by the more or less successful development of the autogiro. The autogiro, however, is not a helicopter, nor is it capable of true vertical ascent. Some of the later autogiros with the so-called jump take-off are in a limited degree helicopters, but for short periods of time only. This does not warrant including them in the true helicopter category because during most of their flight no power is applied directly to the rotor. The possibilities of the true helicopter have attracted the attention of a number of our outstanding airplane designers. Success is not yet, but there are indications that, given a reasonable amount of effort, the next few years may see a practical machine developed.

The idea is possibly older than aviation itself. Da Vinci gave the problem considerable thought. His notebooks indicate that he built small models which flew successfully, and that he made plans for a machine some ninety-six feet in diameter with a linen-covered framework of iron and bamboo. He never built it because he had no power available to drive it. But the fundamental concept goes back farther than that. We find reference in ancient oriental literature to the so-called Chinese Top, probably the first heavier-than-air device actually to fly. No one knows exactly how long ago it originated, but as a toy it appeared in Europe shortly after the first balloon flight of the Montgolfiers in 1783. It was exhibited as a scientific curiosity before the French Académie des Sciences by Launoy and Bienvenu in 1784. Sir George Cayley, experimenting a few years later with various flying machines in England, built several modifications of the Chinese Top. One of his machines, according to his own notes, rose as much as ninety feet in the air. Sir George made some sketches for a full-size steam-driven helicopter, which in some respects was not unlike the successful Focke-Achgelis machine of 1937. There is no indication, however, that he ever carried the idea beyond the model stage.

A number of helicopter proposals and models were put on display in the exhibition of the Aeronautical Society of Great Britain at London in 1868. Among them were designs from the fertile imagination of Felix Tournachon, otherwise known as A. Nadar. None of these had any practical value whatever, but they did stimulate popular imagination to the point that many curious notions for "aerial steamers" began to appear in the public prints, most of them definitely of the Jules Verne variety. A number of experimental models were actually constructed, but there is no account of any real success until 1878 when Enrico Forlanini, an Italian professor of civil engineering, built a model that weighed almost eight pounds and was driven by a one-quarter-horsepower steam engine. It succeeded in hoisting itself over forty feet in flights of about twenty seconds.



Scale model of Leonardo da Vinci's design for an "aerial screw," which heralded the helicopter. To furnish motive power, he designed a spring-driven mechanism much like modern clockwork. The model is shown, together with other examples of the famous painter-scientist's work in aeronautics, as part of an exhibition of his scientific achievements now at the New York Museum of Science and Industry.

Several experimenters in the late 1800's began to use the then newly developed electric motor to test helicopter ideas. Gustav Trouve exhibited an electric helicopter before the French scientific societies of 1887 and 1888. He used a small electric motor of remarkably light weight which flew the model successfully — but not with the necessary power supply on board. Current was furnished to the motor through a pair of trailing wires, a feature which undoubtedly lent considerable stability to the models in flight. Trouve then proposed a large machine of the same type for military purposes, anticipating Von Kármán and Petroczy by over thirty years, but the project was not carried out.

Maurice Léger, working in Monaco in 1905, built an experimental helicopter consisting



Igor Sikorsky's helicopter in flight, with the inventor at the controls

Vought-Sikorsky Aircraft

of two 20-foot counterrotating airscrews, electrically driven. The motors, however, stayed on the ground, driving the propellers through flexible shafting. This setup was obviously not intended to be flown, but it was used to develop certain fundamental data on the airscrew as a listing device. Léger's results show agreement with current theory.

In 1907 a Frenchman, Paul Cornu, built a full-scale helicopter that was the first to have any real promise of actually flying. His two 20-foot lifting screws were mounted on outriggers in the modern manner. They were driven by a twenty-four-horsepower Antoinette airplane engine. The machine allegedly got into the air for a few seconds at a time but once off the ground proved quite uncontrollable.

Thomas Edison, in America, became interested in the problem and made tests on vertically acting airscrews driven by electric motors. He mounted the machines on platform scales to measure the amount of lift developed, but never succeeded in getting off the ground. He was convinced of the ultimate success of the helicopter and, when questioned about airplanes and helicopters in 1908, said, "Whatever progress the airplane might make, the helicopter will come to be taken up by the advanced students of aeronautics." Today, Mr. Edison's statement of thirty-odd years ago seems to have been prophetic. After many years in which the airplane has held the center of the stage and has been developed to a remarkable degree, interest is being revived in the possibilities of the helicopter. Several full-scale projects are now under way, some of them by men who have previously made names for themselves in the field of airplane design.

The case of Igor Sikorsky illustrates the point. Back in 1908, when he was beginning to turn his thoughts to flying, the helicopter seemed to him the most logical thing to try first. He lacked money to buy an engine, but his sister, Olga, came to his assistance and supplied him with enough to buy a twenty-five-horsepower three-cylinder Anzani motor. Young Sikorsky had been to Paris early in 1909 and had seen this engine used successfully in a number of French airplanes.

His first helicopter did not prove much. It had two two-bladed concentric lifting propellers — the upper sixteen feet in diameter, the lower sixteen and one-half feet in diameter — rotating in opposite directions at 160 revolutions a minute. Late in the summer of 1909 he was ready to test it, but it was apparent from the first that the machine would never fly. It vibrated badly and showed little signs of lifting itself from the ground. Nothing daunted, Sikorsky spent the winter with a new design, which was ready in the spring of 1910. This time the results were somewhat better, for the machine lifted its own weight of 400 pounds, but could not take care of pilots or passengers. Try as he would he could not see how to remedy this situation. Besides, he was becoming increasingly interested in airplane design; so he put the helicopter idea on the shelf for almost thirty years.

Today, after many years of outstanding success as an airplane designer, beginning with the multiengined machines he built for the Czar of the Russias in 1916, down to the great clippers that have been flying Pan-American Airways' Pacific and Atlantic routes, Sikorsky has again turned his attention, this time with some success, to the problem of vertical flight. Last April, after many months of secret experimentation in his plant at Bridgeport, Connecticut, he made the first public demonstration of a helicopter that has the earmarks of practicality. At first the machine was underpowered. By overspeeding the motor on the ground it was possible to make hops of short duration, and it was enough to prove that the machine could be flown and controlled. After a long series of tests a ninety-horsepower engine was installed and performance was greatly improved. By mid-July a number of satisfactory flights had been made, one of them being of fifteen minutes' duration, which, as far as is known, is the longest flight ever made in the United States with a direct-lift machine. Sikorsky reported the performance and control characteristics as satisfactory and extremely promising. He could lift the machine directly off the (*Continued on page 83*)

Boring History

Ancient Workers Drove Holes with Flint Drills and Core Drills and Pump, Strap, and Bow Drills

By Leroy L. Thwing

TO argue that the rivet is more important than the rivet hole or that the shaft is more important than the bearing in which it turns, would be a waste of time, but it could be argued that holes are more nearly fundamental to the mechanical arts than are either rivets or shafts. If we were unable to drill holes, everything would have to be made in one piece unless it were mortised, glued, or welded together. A great advance has been made in welding technique in the past twenty years, but, generally speaking, our structures, machinery, and furniture are made of various parts which are riveted, bolted, doweled, screwed, or nailed together. Rivet holes are made with punches and drills; holes in wood, with bits and augers. Wood screws and nails, however, are more self-sufficient, since they make their own holes as they go along.



*Fig. 1. Drill point **

If holes are of such importance, we should naturally expect that the ability to make them would be very ancient, as, in fact, it is. Flint borers hundreds of thousands of years old are found among the oldest of the chipped stone tools of prehistoric man. Fifty thousand years ago the flint drill was so well developed that there was little subsequent improvement except in methods of rotation. The earliest chipped stone tools were simple and were used indiscriminately as axes, chisels, and scrapers, but they could not be used to drill holes. The flint drill was probably the first special-purpose tool developed by primitive man. A by-product of this development was the fire drill, which may have been the device with which man first made fire at will.

The first flint drill points were short and blunt, but over a period of hundreds of thousands of years they developed into long flint borers. They were strictly hand tools at first, and the amount of rotation given them was limited to a twist of the wrist. The drill point illustrated in Fig. 1 is typical. Its use is restricted to the softer materials, such as shells, bone, and so on, and the holes would be tapering.

In addition to flint drill points, primitive men must have had some other means of drilling hard materials, as there are many existing examples of long, small, smooth holes drilled in stone as hard as flint itself. In the National Museum in Washington are a number of beads found in Mississippi. They are made of red jasper, which is too hard to be scratched by any modern steel tool. In the American Museum of Natural History in New York City are hundreds of drum-shaped beads about a quarter of an inch in diameter, each pierced with a hole 1/32 of an inch in diameter; some of these are a quarter of an inch long. These beads are made of turquoise matrix, which is just a little softer than hard steel. They came from California and are about a thousand years old. The men who drilled them had no metals whatsoever. I have examined many of these beads; the holes are smooth, round, and not noticeably bellmouthed. The beads are truly cylindrical within less than one-thousandth of an inch by micrometer and run true on the hole. These are typical examples of primitive drilling of small holes, but in other museums in other parts of the world are larger holes, such as those in banner stones and in stone axes. In Egypt, moreover, are large holes cleanly drilled through — or into — the solid rock.

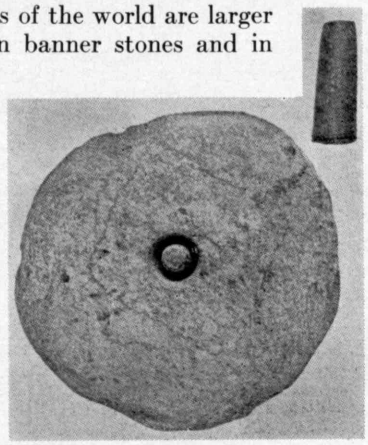


Fig. 2. Hole and core

There are plausible explanations and considerable evidence of the methods used to drill such holes as the foregoing, but it is not easy to explain the method used to drill certain beads on view in the American Museum of Natural History. These beads appear to be made of clay, but they are not; they are made of stone. Each is about four inches long, *crescent shaped*, and pierced from end to end with an eighth-inch hole. Since this hole is not straight (you cannot see light through it), the observer's first thought is that the hole was drilled along the axis of the bead, on the arc of a circle — a most difficult, if not impossible, task. A more likely explanation is that holes were drilled from each end and met in the middle. What seems to be a shoulder at the meeting point can be felt with a wire. This failure of the drill holes to meet head on simplifies the problem somewhat, but anyone who has tried by hand to drill holes from each end of a long wooden cylinder and have them meet in the

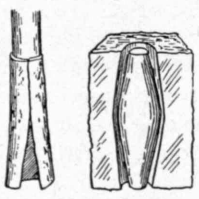


Fig. 3. Tubular drill, spread

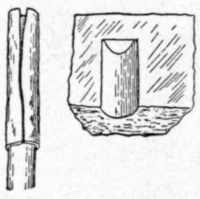


Fig. 4. Tubular drill, unspread

*All illustrations except Fig. 2 are from the Report of the United States National Museum for 1894. Figure 2 is from *Die Technik der Vorzeit, der geschichtlichen Zeit und der Naturvölker* by F. M. Feldhaus.

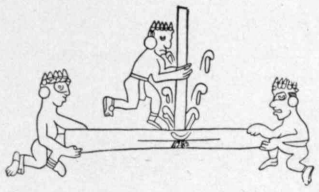


Fig. 5. Palm method

middle can testify to the difficulty of this operation. The makers of wooden pipe — the pump makers and blockmakers of the Eighteenth Century — did not attempt it if they could avoid it. How the Indians of California could have drilled such holes is a mystery. In the words of a curator of the museum: ". . . The question still remains as to what they used for drilling such a long, small-diameter hole."

In the Dark Ages the ancients were believed to have had the secret of softening stone, which enabled them to drill holes in precious stones and then harden the stones again. This was one of the so-called lost arts, such as the art of making malleable glass, about which Wendell Phillips used to lecture. Unless we subscribe to the ancient belief, some sort of grinding or abrasive process seems to have been the only possible method for drilling such small, smooth holes as those of the museum beads.

Grinding processes are very old. The tools and ornaments of the Neolithic, or Polished Stone, Age were first roughed out by being chipped and then were finished by being ground and polished. The wampum of the American Indian was made of shells or other animal material shaped by being rubbed on a piece of sandstone, drilled, and strung on a thong. The wampum holes were probably drilled with flint borers, but holes in banner stones and in jasper beads must have been drilled by some kind of grinding process. Archaeologists suggest that the smallest holes were drilled with splinters rolled in sand, and the larger holes, either with bigger solid pieces of wood or with core drills. They may have deduced the use of the wooden lap, but ample evidence of prehistoric core drilling exists. In core drilling, either ancient or modern, the edge of a tube is charged with an abrasive — in modern practice it is set with diamonds — and rotated in contact with the stone to be drilled, in which it cuts a circular groove and leaves a solid cylindrical core, which either drops out or is broken off. The core drill is a sort of rotary biscuit cutter, in which the biscuit is the core. Figure 2 shows an uncompleted hole and the core from another hole. Figures 3 and 4 illustrate the method used. In Fig. 3 the tube has spread, resulting in a hole that is larger in the middle than at the outside. Stone axheads pierced with such holes must have been drilled in this way. These illustrations indicate the use of metals. Our western Indians had copper and the Egyptians had bronze in the earliest historical times; furthermore, a hollow stem or twig can be used for small holes.

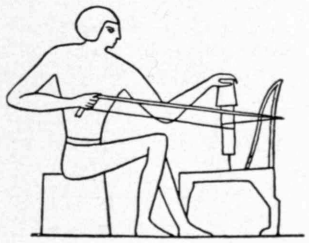


Fig. 9. Egyptian bow drill



Fig. 7. Eskimo using strap drill

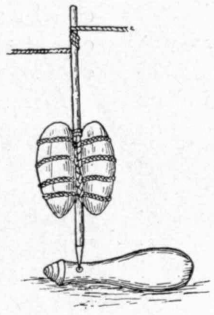


Fig. 8. New Zealand drill

A complete reconstruction of the various drilling methods of prehistoric men is evidently impossible, but we have many examples of their work and also a knowledge of the procedures used by primitive races today. The actual tools were simple, but methods and appliances to rotate them developed slowly. The first step was to mount the drill in or on a wooden shaft or drill holder. This could be rolled between the palms or on the thigh. That the palm method is not entirely conjectural is shown in a Mexican wall painting (Fig. 5). Two helpers are holding a log while it is being drilled. The artist may have exaggerated the size of the drill and the chips, but the method is clear. Figure 6 illustrates the thigh method used by the Indians to drill shells for wampum.

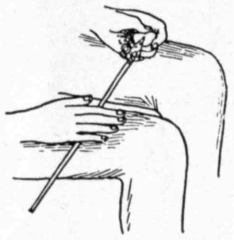


Fig. 6. Thigh method

Both these methods have their limitations; little speed, power, or pressure can be applied to the work. Although not absolutely necessary for small holes, greater speed would be an advantage, and more power would be needed for larger holes. After some probably lengthy period of time, it was discovered in various parts of the world that by wrapping a thong around the drillshaft, a man could rotate the drill in the manner shown in Fig. 7. This was a great improvement, but as a one-man device, it required the use of both hands, both legs, and the teeth. The next improvement was to have the drill rotated by one or more other men. This latter method was used as early as 900 B.C. to drill large holes in wood. We know this fact because Homer, in the *Odyssey*, describes the method used in his day for drilling treenail holes in ship timber. When Ulysses tells how he and his men put out the single eye of the Cyclops, he says: "I thrust the stake into the embers until it became hot . . . and some of the others thrust it into his eye, while I standing above, turned it round and round, as when a man bores a ship's timber with a drill, having bound it around with a thong, while others laying hold on either side turn it constantly. . . ." It is not difficult to reconstruct this scene: The master driller stands and holds the drillshaft erect in a socket at the top. A thong is given a turn or two around the shaft, and two helpers pull alternately, rotating the shaft until a hole is "worried" through the timber. Scientists call this a strap drill (Fig. 8).

A development of the strap drill is the bow drill, the earliest types of which did not use the elastic bow to keep the cord tight. They used rigid rods with handles and drew the cords tight, as shown in Fig. 9, taken from an Egyptian wall painting. This rotating device has been widely used over a long period of time. Until quite re- (*Continued on page 86*)

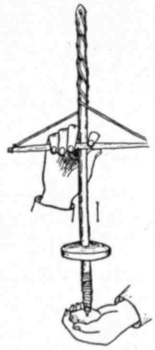


Fig. 10. Pump drill

Motor Necrology

If Drivers Cannot Control Cars, Ways of Controlling Drivers Must Be Considered

By John W. Meader

NO one has yet been able to make the people of the United States appreciate the enormity of their motor-vehicle accident record. No thought being entertained, therefore, of convincing a majority that the affair is serious, the situation is herein sketched very briefly.

The number of persons killed in motorcar accidents in the United States in July, August, and September — 9,190, according to the National Safety Council — exceeded British civilian deaths resulting from air bombings from the time heavy fighting began through September — 8,365, as reported to the Commons by Winston Churchill. Our seasonal peak of motor accidents was still to come. We have dispatched more people in motor accidents since 1933 than the number of soldiers killed or dead of wounds in all the wars we have fought. Imagine the complete annihilation each year of a city of something over 32,000 population — a city like Norwalk, Conn., Elgin, Ill., or Santa Barbara, Calif. — to get an idea of the annual death toll. Or envision a recurring catastrophe which left every man, woman, and child in Los Angeles more or less fatally injured, to see the human damage — no matter about the loss of property.

But the facts will not impress. At least, they have not done so; year after year we go on laying out upwards of 30,000 corpses and a million lesser derelicts. Yet the few who are curious about the whys and wherefores of this ghoulish phase of Americana may be interested in a look at the accident record and may want to consider what can be done toward reducing the melancholy totals. Those who have combed the ground with greatest care are sure they know what is needed and will guarantee with their professional reputations a 50 per cent reduction in automobile deaths, starting almost immediately!

There is really no such thing as an accident in the sense of something untoward just happening in an inscrutable, uncontrollable fashion. On the whole, either a car is pushed and steered into a collision or clear proof exists of failure to divert the car from an impending collision by a change in course or speed or both. In either event there is a failure of the human portion of the control mechanism. A detailed knowledge of this mechanism, regarded as a whole, is essential for a proper understanding of motor-accident causes.

The control of a car depends upon a set of environmental conditions. The width of the road, the nature of the margins, the grade, curvature, and surface, the obstacles present *or presentable*, the *speed* of the vehicle, its characteristics of acceleration, deceleration, and stability — these are the principal physical circumstances which determine absolutely whether a collision may or may not occur. Knowledge of these determining conditions, impaired or impeded in transmission by fog, rain, dirty windshield, noise level, and so on, reaches an attentive driver through his sensory perceptions, most important of which is his vision. Now the driver goes to work. The information received must be sorted, weighed, and assembled into a conclusion and, if necessary, a purpose of action. Then come the driver's motor responses, whereby the car controls are actuated. The car proceeds to do exactly what he *made* it do, although that may not be what he *wanted* it to do.

If accidents are to be precluded, no break may occur in this long chain which begins with highway conditions and ends with the coefficient of friction of rubber on concrete. Obviously, a continuous operating load is thrown on the driver — the weakest link of the chain. There is no time at any average speed for all his mental operations to be on a conscious plane. The fumblings and labored thought processes of the beginner were long since grooved into habit, for better or for worse. Naturally, no engineer would deliberately specify so unreliable a piece of machinery as a human being for so complicated a task as the driver must perform. The engineer can at most facilitate the mechanical operations of the control process, but that is all, and that is not enough.

A careful study of the control process shows dozens of opportunities of accident prevention through purely mechanical changes. To cite some of the most flagrant examples: No good excuse can be offered for the extreme rake given to windshields in current designs; or for small windshields; or for bulky corner posts in the field of vision; or for a three-passenger driver's seat. At the other end of the control chain, there is not much excuse, in the present state of the art, for cars which are directionally unstable in being braked from high speeds, as many cars are; or for the use of windbreaks, in the form of fake streamline tinware, which effectually prevent brake cooling. Many other little faults could be pointed out, but no amount of mechanical change and improvement, as such, will do more than make a dent in the accident problem. For real progress, we must turn to the driver. The success of the control mechanism depends so heavily on him that progress will be achieved more readily through an objective study of his characteristics than through research of any other kind. Presumptive proof of this statement is shown in the fact that obsolete cars are much less liable to serious accidents than are the most recent products.

The driver plays a dual role: He is the proud owner, or at least the one who directs the general course and speed of the vehicle. He would like to get where he is going in

no time at all. But he is also the operator. As such he will have acquired some sense of the car's and his own limitations and, through practice, more or less facility in the operating job. He is predisposed, however, to appreciate the car's limitations more clearly than his own; the roles of director and operator almost invariably conflict. Reason struggles with emotion. As a result of fatigue or alcohol, reason weakens and emotion becomes increasingly insistent. Only when the operator exerts a conscious self-restraint, continuously adjusted to the conditions of the moment, can he be said to have the possibility of collision under reasonable control. It is true that automobile drivers as a whole are constitutionally capable of exercising sufficient emotional restraint under all varieties of conditions which they meet, but only a very small number of supercharged drivers is needed to ring up the grisly figures.

The paramount physiological shortcoming is an inability to judge speed accurately in a quiet, closed car. Without a windshield the pressure (of still air) against the driver's face would vary almost directly in proportion to the shortest stopping distance *after* brake application. Behind the windshield of a closed car he has practically nothing but his visual sense as a guide.

The human eye is in some respects a very crude instrument. It has little resolving power and is handicapped with a blind spot and a pronounced time lag to changes in the field. The visual sense works at a special disadvantage when it must translate a change in the size of the image (as of an obstruction) into an estimate of relative speed. We are at great pains in the control of naval gunfire to correct for these deficiencies, yet we accept them in civil life in the control of an instrument with a much more impressive lethal record. The speedometer of an automobile is of very little help. It is not, and should not be, in the field of vision. Although all speedometers are geared somewhat fast, the standard linear dial grossly distorts the vital implications of the speed registered. Only a scale proportioned to the *square* of the speed with adjustment for reaction time could approximate the true situation. A scale calibrated in danger units would horrify many automobilists.

We do not have to look far to find that excessive speed is the principal cause of motor-vehicle deaths. One of the best bits of evidence is the surprisingly uniform total of dismal consequence during recent years, when hundreds of agencies have been moving heaven and earth to reduce the deaths even as car speeds have been going up and up. The following figures are those of the National Safety Council.

Year	*Number of Deaths*	*Number of Deaths per 100,000 Population*
1928	27,996	23.3
1929	31,215	25.7
1930	32,929	26.7
1931	33,675	27.1
1932	29,451	23.6
1933	31,363	24.9
1934	36,101	28.5
1935	36,369	28.5
1936	38,089	29.7
1937	39,643	30.7
1938	32,582	25.0
1939	32,600	24.9

The 1940 figure, from preliminary indications, will show that fatalities are again on the way up. If, as some argue, the trend in the number of deaths per vehicle mile has been declining, this fact would mean only that we now go farther, but not longer, to meet our fate. No significant change has taken place in the total of deaths relative to the number of motor vehicles in use.

During the past decade a tremendous cumulative effort has been made to bring down the fatality rate. We have better roads, better (*Continued on page 89*)



Wide World Photos

Mobility at rest — a modern parking lot

Net Returns from the Banks

Otter Trawls in the Modern Manner Gather Tons of Fish, and Quick-Freezing Methods Balance the Nation's Markets

By Richard Hallet

I TOLD a friend that I was going on a trip in the trawler *Storm*, and he said at once: "The *Storm* — I remember reading about her; she's the fisherman with shower baths."

More than that, on board the *Storm* the men have cantaloupe for breakfast and strawberries in season; but with all these handicaps she catches plenty of fish. It's hard to say where the line should be drawn against luxury on the sea. I did hear tell of a trawler captain who smoked perfumed cigarettes and dashed cologne on his handkerchief. That was just the last straw, and he had to go redfishing because the codfish smelled him coming.

The *Storm* hasn't the cologne handicap. She's a steel-built ship — 143 net tons, 144 feet over all — and she can carry 350,000 pounds of fish in her nickel-plated holds, which are kept cool with chipped ice and an ammonia coil. The *Storm* is the last word in the science of catching fish. Her six-cylinder, heavy-duty, self-lubricating, McIntosh and Seymour Diesel engine is a floating powerhouse big enough to run a small city. A fan throws into her fish holds 1,800 cubic feet of cold air a minute, right off that ammonia coil. Her radio gives her bearings and keeps her up to the minute on market conditions. Her fathometer flashes soundings which enable her to stay where the fish are thickest. Her electric winches can pick up 6,000 pounds of fish in one grab.

But here the precision stops short. We have come to the net and the sea bottom. There is no device that whispers to fish and tells them to go into the net. That's a blind drag — either the fish go in or they go clear. The *Storm's* nets are made in Grimsby, England. They are 150 feet long and 78 feet from wing tip to wing tip. The belly, or bottom, meshes of the net are sheathed with a patchwork of cowskins, which protect it against jagged rocks. The lower jaw of the net is a wire cable, on which are threaded wooden wheels cut from rounds of trees. These wheels roll that jaw over obstructions and look like a giant wooden necklace. The top jaw is held up by metal buoys seized to the headrope.

The wings which usher the fish into this huge blind mouth are stretched wide by wooden "doors" which are steel shod and are so attached to the main dragging wires that they fly kitewise, opening the net to its fullest extent at a towing speed of from two to three miles an hour. These doors grind over rocks and dip into gullies; the wooden wheels, so waterlogged that one wheel is a lift for a strong man, roll forward; the fish swim in and ball up in the cod end, which is the very end of the net, in shape like a giant finger cot of four-strand twine. A swordfish may slash his way out of this net. Even a shark has it in him to bull his way out; his nose is delicate, however, and dislikes the feel of twine, so that an occasional shark does come up with the rest of the catch. But cod and haddock, once they venture in, have a poor show for their lives.

General Seafoods Corporation



When this Diesel-powered steel-built trawler returns to Boston from the Georges Bank, her nickel-plated holds will carry approximately three hundred thousand pounds of fish, netted by the technique shown in the opposite sketch of a trawl in use. Note the "door" on the net end of each towing wire. Weighing almost a ton each, these doors keep open the entrance to the fish's finish.

The *Storm* wastes no time. She came into the South Boston fish pier on a Tuesday morning, and by Wednesday at 1:00 P.M., when I boarded her, she was off again on her 210-mile journey to the northeast peak of Georges Shoal. This was in July. In winter, the *Storm* may go as far east as the Sable Island, or Western, Bank, or even to Banquereau, but in summer the captain is mistrustful of fish caught too far east. It makes too long a haul — nearer a fourteen- than an eight-day trip.

Watches were set: At sea, the *Storm's* men go six hours on and six hours off; once on the grounds, the ship fishes continuously, day and night. She tows her net for an hour and ten minutes — sometimes for as long as an hour and a half — and so averages ten to twelve and sometimes fourteen bags of fish for the twenty-four hours. Three thousand to five thousand pounds of fish make an average summer bag. I believe the record bag was forty thousand pounds.

Our first set was made at about ten o'clock in the morning on Georges Bank. Over went the net on the starboard side; after it, with a splash, went the 1,800-pound doors. Next, the main towing wires were paid out. The *Storm* circled and streamed her net, then altered her course to bring the towing wires more aft. A big hook grappled the wires together, and the winch brought them in against the ship's side and prisoned them in the knockout block fixed at the stern rail. There the two wires were not an inch apart, but they led down to the two doors. The towing motion forces the doors in opposite directions, and opens wide the wings of the net, to "welcome little fishes in with gently smiling jaws."

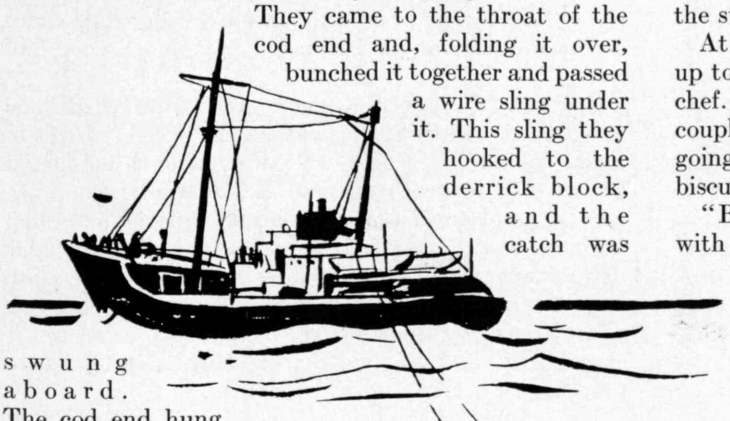
The net, crawling on the bottom, must look rather like a dragonfly with a very wide mouth. But there's no looking at it. From the *Storm's* bridge, there's no telling at what spot or spots the fish enter. Lately the Germans are said to have a gadget that registers increasing pressure on the wires as the net fills. This instrument should enable the ship to turn round and round inside a spot of

fish, keeping always at the point of greatest concentration. The British claim that they can use the fathometer to mark fish. This statement sounds reasonable, for if you can bounce an echo off the bed of the ocean, why not bounce it off the backs of fish if they run close enough together? Some fish do school so close that they clash and score and scar each other's sides. But I do not give this story on my own authority.

After dragging an hour and ten minutes, Captain Michael Shea of the *Storm* rang his engines astern, and the towing watch jumped into oilskins. They forced the pin out of the patent knockout block. The towing wires sprang apart, and winches under the pilothouse reeled them in.

The *Storm* seemed to brace herself, like a cow pony on the western plains whose rider has got his lariat around a steer's hind hoof. The boat circled to come round to leeward of the net. Then the doors came out of the sea and banged against the gallows. These frames, inverted steel U's, are fixed, one forward and one aft, against the *Storm's* rail and from them hang the sheaves through which the towing wires run inboard to the winches. After the doors, came the ground cables attached to the wings of the net. Finally the cod end bounced up, shining white with the cowskins on its belly. The towing watch clustered amidships, hauling the net over the rail. They swayed back and forth, dragging at the meshes with iron hooks; the net came harder and harder; they waited for a roll of the ship to gain another foot.

"Haul away, boys, haul away," the captain shouted. They came to the throat of the cod end and, folding it over, bunched it together and passed a wire sling under it. This sling they hooked to the derrick block, and the catch was swung aboard. The cod end hung over one of the four shallow bins on the foredeck. One man pulled the cod-end knot in the very bottom of the bag. This is a crafty knot that unwinds slowly enough to let the man opening the bottom of the net get away from an avalanche of cold fish. It's no joke to have 7,000 or 8,000 pounds of cod and haddock rain down on your devoted head. In winter, when seas are rough, a man may slip and fall, and find himself buried under live fish. Then his mates must turn to and fishfork him out.



"Cod are worse than haddock for falling on a man's head," Captain Shea maintained. "Come at you like a ton of rocks."

I couldn't think that even the same weight of haddock would be like an eider-down quilt; but cod, he said, have more spring in their heels.

I looked at the contents of the bin. Certainly the drag was not selective; as usual, it was a democratic haul, with cod and haddock and pollack rubbing scales with sculpins and the hideous monkfish; with catfish and butterfish and breams and scallops and clams and now and then a lobster. Shrimps and crabs and starfish and sand dollars lay scattered among bigger fish; and now and then there was a rusted anchor. It wouldn't have been surprising to find Long John Silver's wooden leg at the bottom of the heap.

The watch on deck disposed of the catch. They forked overboard the undesirables: the sculpins, the monkfish, and the skates. Skates are the worst; if they are too thick, they drive the money fish away, just as dogfish blast the hopes of line fishermen. In Europe, skates themselves are money fish and bring at least half the price of good cod; not so with us. Two men ripped the fish with quick motions of the knife — the whetstone is ever handy — and two more gutted them and threw them into a bin amidships, whence, after a sluicing with the salt water hose, they were forked down into the refrigerated hold. Both ripping and gutting are hard work, especially in winter when men sometimes get "overgrasp," a torturing cramp of the muscles in the forearm.

About this time the trawler *Boston* went past us, homeward bound. Tomorrow her fish would be filleted and headed for the West. Twenty years ago hardly a fish that swims in salt water was eaten two hundred miles inland; now the Dust Bowl receives the yield of the North Atlantic in good condition, as it receives also the swordfish exported to it by the Japanese.

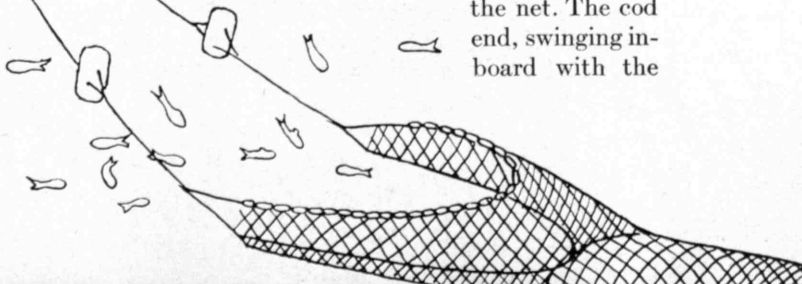
At five-thirty in the afternoon, the watch below came up to eat. The *Storm* has a spotless galley and a skilled chef. The watch pitched in with zeal, beginning with a couple of helpings of fish chowder to lay a foundation, going on to meat and potatoes with vegetables and hot biscuits, and topping off with pies and ice cream.

"Bending and twisting and hauling the way they do, with all those side motions," the chef said to me, "the men can wear down a lot of grub in a day's work."

At least it's their own grub and not the company's. As the lay now is, the company furnishes ship and fishing gear, and the men buy fuel, food, ice, and even their own blankets. It makes as much difference to the men as to the company whether haddock is four or four and a half cents a pound when they come into port after a session out on the fishing grounds. Also, it's an advantage to the men to be shipping out with a high-line captain, such as Captain Shea. Mike Shea knew where he was, "like walking in the street." Having long haunted this neighborhood, he had a kind of fathometer inside him that told him when he was getting on fish. He had a nose for fish and never lost that feeling that the next bag would be a "floater."

"First he smells them out, and then he speaks to them and tells them where to stick their noses," Joe Flynn said.

And that would be, naturally, into the bag. Bag by bag we filled the holds, and more and more moss got into the meshes of the net. The cod end, swinging inboard with the



hair wearing more and more off its cowskin belly, looked half like a decapitated whale and half like a woolly sheep. Other trawlers began to heave in sight, their sixth sense telling them that the *Storm* was getting good bags. Certainly some of the captain's friends knew, for he had picked out a ring of truthful men who were willing to tell him the situation exactly as it was. They exchanged "hails" by radio, truthfully speaking the weight of each bag as it came in. They were not like certain other skippers who might be over a spot of fish so thick that a man couldn't slide between their backs, and still radio, "No fish." Or, worse yet, bring up nothing but mud and shells, signal, "Fishing's fine here" — and steam away.

There came a lean bag of fish.

"Ah, the things have gone some place," Captain Shea said darkly. "We must be too far east. I'll have to feel around a bit and try and get on a few."

Fish shift their grounds between drags, for reasons best known to themselves. And they range far. On the Georges Bank, cod have been picked up with French hooks in their mouths from the Grand Bank, a thousand miles away. The Grand Bank is still an international city of the sea, even as in the days of schooner and dory fishing. The British have trawlers there, and so have the Danes, the French, and the Spaniards. I have heard of a late type of Spanish trawler with double decks, including a shelter deck for gutting the fish. Spaniards always did run to galleons.

One man in our crew, Danny Houghton, had fished the whole continental shelf from Iceland to Morocco and from the Barents Sea to the west of Scotland, Rockall, and the southwest of Ireland, where trawlers fish in waters all but fathomless. Once Danny was frozen into Iceland's ice pack. This was just after the last war, and the government had taken away the ship's radio. Hence the ship had no way to cry out to the land that the ice had pinched her in, and there she lay for months. The fish in her holds turned pink, and at last her men ate the very rats — which are no part of the *Storm's* diet.

The North Sea has been overfished, but our American Banks still yield well. The trawlers may of course depopulate them in the end. I have heard it said that the otter trawl threatens extinction of fish by hauling their feed off the grounds. The dragnet, so the argument goes, tears loose and crushes the marine growths — the sponges, sea moss, anemones, mussels, crabs, shrimps, sea pumpkins, worms, and microscopic plants — on which the food fish live. It is hard, however, to see what harm, actually, is done to these food supplies by the dragnet. An area of eighty acres is swept in a drag of an hour and twenty minutes, and on the whole the fish come up fairly clean. Sometimes there may be a bushel of trash — at most four or five bushels — but this is shoveled right back again. And it is certainly not true that the otter trawl destroys the spawn of food fish, since on the New England Coast the eggs of all important food fish — except herring — are pelagic and float at or near the surface.

It is true, however, that the trawls take smaller fish than the old Gloucestermen took and that this is a threat to the population of the Banks. In the North Sea, nets have been designed with windows or frames in the cod end, to hold certain meshes open at all times and allow smaller fish to escape. In this country, there is a movement to enlarge the mesh of the net, but whether bigger meshes will turn the trick is still a question. Towing drags the meshes out flat and prevents escape until the fish is at the surface, and by then he is poke blowed. Often I saw stray cod or haddock floating belly up and trying with ineffectual wriggles to work the excess air out of them. Now and then a puff of air escaped in silver bubbles.

"Haddock are better than cod at regaining their depths," Captain Shea said. "Pick up one of these fish now, and squeeze him in your two hands and throw him back. Down he'll go like a cobblestone."

Winter fishing on a trawler is better than summer fishing but entails more hardship. There's more of slambanging and rolling and jerking, more chance of a dangerous fall, more chance, too, of ruining the net. Brine ice molds itself in fantastic corrugations on the ship's rails, shrouds, masts, booms, and winches. The skipper may have to punch out the pilothouse windows to see ahead, ice forms so fast on the glass. The ship develops a top-heavy roll, and the crew are forced to pinch up their mattresses, with life preservers wedged under the edges, to keep from rolling out in their sleep.

Even so, they do roll out sometimes. George Greek of the *Storm* was pitched out of an upper bunk on the port side and dropped, mattress and all, into a lower bunk on the starboard side of the fo'c'stle. Flying through the air, he woke up enough to hug his mattress tight, but it got on top and he broke the fall for it by coming down across the edge of the bunk and breaking a couple of ribs.

The *Storm* brought into the South Boston pier a little under three hundred thousand pounds of fish, caught in seven days. Most of this catch was going to be filleted and quick frozen with all speed. A revolution in methods has taken place in the last decade. Before that time, nothing was more strongly rooted than the popular prejudice against frozen fish — a prejudice resulting from the custom that dealers had of freezing stale fish and doing so by the slow-freezing process. After much experimenting, various quick-freezing methods were found to be better than slow freezing.

First, however, unsanitary conditions in the industry had to be cleaned up, to guard against bacterial infection on the ship, as well as on the wharves, in the markets, and in the fish-packing plants. As disinfectants, chlorinated sea water and sodium hypochlorite solutions have demonstrated their value. Water from the outer harbor, chlorinated to about seven parts per million on the suction side of the pump, is used to wash the fish on the receiving wharf and is also sprayed on the fish fillets before they enter the brining machine. The antiseptic strength of this disinfectant greatly reduces the number of bacteria on the surface of the fish. The floors and machines of the filleting plant are also frequently flushed with this chlorinated sea water and are scrubbed at night with a strong hypochlorite solution. There is still a genuine need for better sanitation on the fishing vessels themselves. It is now calculated that disinfecting methods reduce the bacterial count of the fish passing through the plant (*Continued on page 88*)

THE INSTITUTE GAZETTE

PREPARED IN COLLABORATION WITH THE TECHNOLOGY NEWS SERVICE

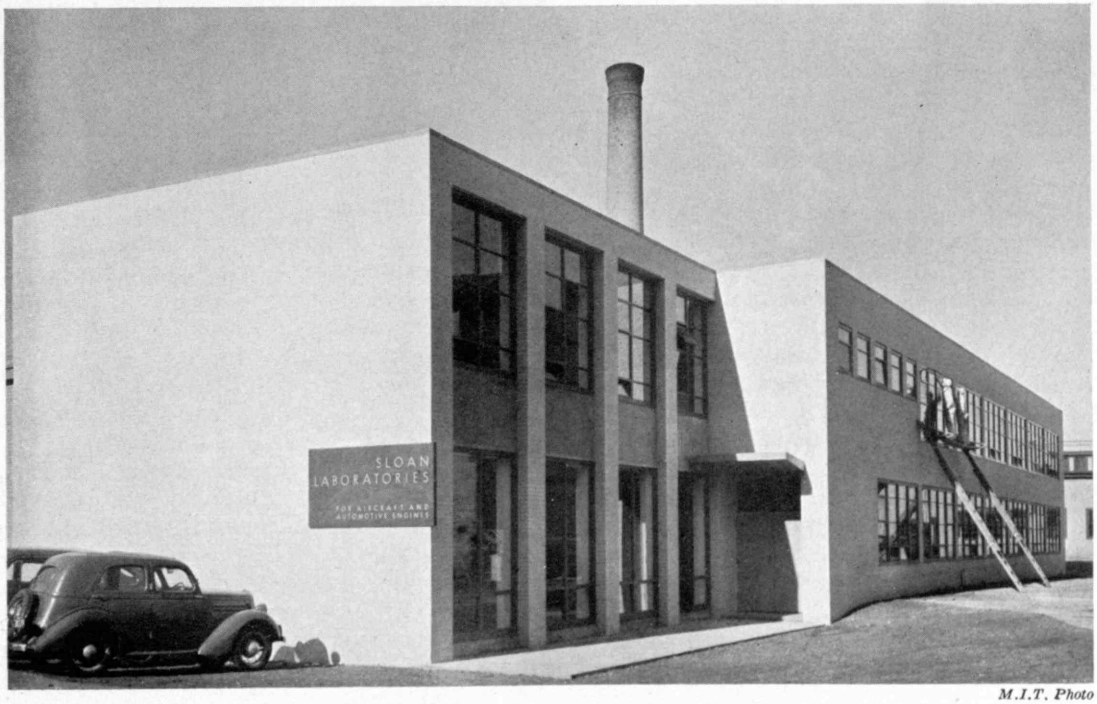
For Better Engines

Augmented Sloan Laboratory Permits Full Research Attack on Problems of Aviation and Automobile Motors

FULL utilization of the highly specialized and thoroughly equipped automotive testing floor which is the chief feature of the original Sloan Automotive Engine Laboratory erected over a decade ago, is insured for the future by completion of a two-story addition to the structure, which has been built through the generosity of Alfred P. Sloan, Jr., '95. The new building, which contains drafting, lecture, machine-shop, storage, and office space, and which enables the Institute again to display the rich possibilities of direct functional architecture, relieves the original laboratory of unfortunate congestion. This congestion could be tolerated well enough in ordinary times, but its elimination became imperative as Technology's abilities had to be more intensively drawn on in the mastery of problems of national defense.

Foresight which recognized early that the Institute's contributions in the design and testing of automotive and aeronautical internal-combustion engines would inevitably be of enhanced value to the country during the present unsettled state of world affairs prompted Mr. Sloan to make available $100,000 to meet the need specified by President Compton in his report to the Corporation in the fall of 1939. Available in June, 1940, the grant was put immediately to work, foundation caissons being got in place that month so that they were ready when contracts for general construction were let early in July. Active use of the building was begun last month by staff and students engaged in the study of automotive engineering.

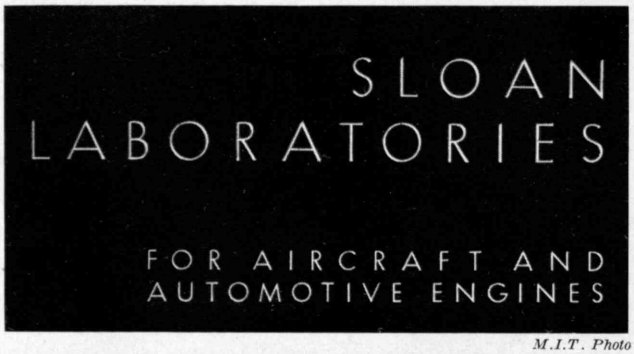
The character of the activities for which the building was destined finds full recognition in the emphasis which the architects — Lawrence B. Anderson, '30, and Herbert L. Beckwith, '26 — have placed upon direct recognition of structural materials. Utility was a primary consideration in the plan of the building. Terra cotta and brick are exposed in the interior, being relieved by the use of a good deal of color, particularly in staff offices. The aesthetic possibilities of painted brick and naturally finished wood are considerable, and many areas in this structure secure full realization of them. Floors are of concrete save in the offices, where linoleum is used. Offices and lecture hall have been given acoustical treatment. Much furniture in all portions of the new building has been built in, including workbenches, cabinets, and book shelves and, of course, carefully systematized ranges of racks for the storage of technical equipment. Movable furniture is of gun-metal finish.



Finishing touches being applied to the new Sloan Laboratories Building. The exhibition room is on the ground floor, nearest the reader.

M.I.T. Photo

Built on caisson piles, with concrete beam and slab construction on grade, the addition has a steel frame and reinforced-concrete floors. Its foundation has been so designed that two additional stories can readily be added to the building. The original Sloan Building was constructed with caissons and grade beams calculated for the ultimate erection of an adjacent four-story building. The first floor of the new unit is devoted primarily to a machine shop and capacious storage room. Its principal feature from the public point of view is an exhibition area opening off the entrance hall and connected to the original laboratory. The exhibition space will be occupied by automotive and airplane engine displays of particular interest. It will be used for exhibitions pointing out the currently significant as well as the historically important. Above the exhibition space, on the second floor, is a commodious classroom, the remainder of this floor being given over to a large drafting room and to offices for the staff.



M.I.T. Photo

The slate plaque emphatic on the façade of the laboratories is one of the distinctions of design marking the building.

Both the drafting room and the first-floor machine shop are lighted by fluorescent tube fixtures, some light from which in the drafting room is diffused from the ceiling. The drafting room also receives daylight through a range of windows high above the floor. Fenestration throughout the building has been planned to secure the best lighting possible and to provide optimum conditions of ventilation, with a system of staggered vents in the windows affording well-spaced ceiling ventilation and concentrated ventilation at sill height. The main distribution duct of the ventilating system which runs through the drafting room has been tapped to supply air under forced circulation to the offices, so that a sufficient pressure differential between interior and exterior may be maintained to hold blown-in dust to a minimum. Mullions between windows have been designed so as to accommodate interior partitions if additional ones should be desired in future.

The vent sections of the many-windowed east wall in this staggered arrangement afford interesting patterning when they are viewed from the exterior. The east wall, with the strong vertical lines of supporting columns between bays and of mullions within the bays as well as with symmetrical configuration of vents, thus possesses considerable liveliness, which balances effectively the vigorous simplicity of the unbroken brick wall constituting the southerly face of the addition. The south wall is relieved only by a sharply contrasting black slate plaque bearing the name of the building. This wall is unbroken because it constitutes the platform end of the second-story lecture room and provides continuous wall for display in the ground-floor exhibition area.

The original Sloan Building was erected in 1929 with funds provided by Mr. Sloan and was equipped largely through the generosity of Henry M. Crane, '95. It was designed purely as a testing space, but auxiliary services, such as computing rooms and storage and machine-shop facilities, took up part of the test floor. Staff offices were at some distance from the testing floor, as were lectures and classes in design. As time went on, considerable congestion resulted from the lack of storage space in the building itself, and hence a not inconsiderable portion of the very adequate and specialized testing floor was pre-empted for nonspecialized purposes. The present addition makes possible employment of the testing floor to the fullest advantage and in addition will facilitate both teaching and research through the consolidation of auxiliary services and the gathering of staff and students close to the principal focus of their research and experimental activities.

Option 2 — automotive engineering — of the Institute's Course in Mechanical Engineering, will have its headquarters in the Sloan Laboratories, which will also be the center of much research on aircraft engines in connection with governmental defense programs. Through manufacturers and through the National Advisory Committee for Aeronautics, many investigations of this sort are already going on. In charge of the laboratories is C. Fayette Taylor, '29, Professor of Automotive Engineering. Research is supervised by Edward S. Taylor, '24, Associate Professor of Automotive Engineering. Dean A. Fales, '14, Associate Professor of Automotive Engineering, is concerned with the automotive vehicle as a whole, rather than primarily with its power plant. Augustus R. Rogowski, '28, Assistant Professor of Aeronautical Engineering, is responsible for work in the laboratory.

Alterations

ON recommendation of the Visiting Committee of the Department of Aeronautical Engineering, extensive alterations have been made in the Guggenheim Aeronautical Laboratory to permit the training of an increased number of engineers in this field. The large wooden wind tunnel, now obsolete, was dismantled and a second floor installed in the two-story space thus released. These alterations have added 1,700 square feet of new drafting-room space and two large lecture rooms, and have permitted enlargement of the aeronautical laboratory. There are also a new instrument laboratory double the size of the former one, a graduate-student room, special research rooms, and an airplane structures laboratory within which is space for a new and more compact wind tunnel to replace the obsolete structure. With the relief provided by the new addition to the Sloan Laboratory, which frees the entire fourth floor of the Guggenheim Building for meteorological studies, the Institute is now equipped to care for a 30 per cent increase in registrants in Aeronautical Engineering.

Nuclear Physics

PROGRESS in one of the most active and promising fields of modern science, nuclear physics, was the subject of a special conference held at the Institute from October 28 to November 2, when more than 600 distinguished experimenters, including three winners of the Nobel Prize, participated in the sessions. The meeting was sponsored by the American Institute of Physics in co-operation with Technology.

Nuclear physics is the investigation of the physical phenomena which occur within the nucleus of the atom, the ultimate building block of which all matter is composed. Scientists have discovered that some of these phenomena can be harnessed for man's use. To the divers practical applications of this branch of science the conference devoted most of its attention. These applications range over a wide field — biology, chemistry, radiology, metallurgy, geology, and public health, to name but a few — and the conference discussed the important problems and trends in all of them.

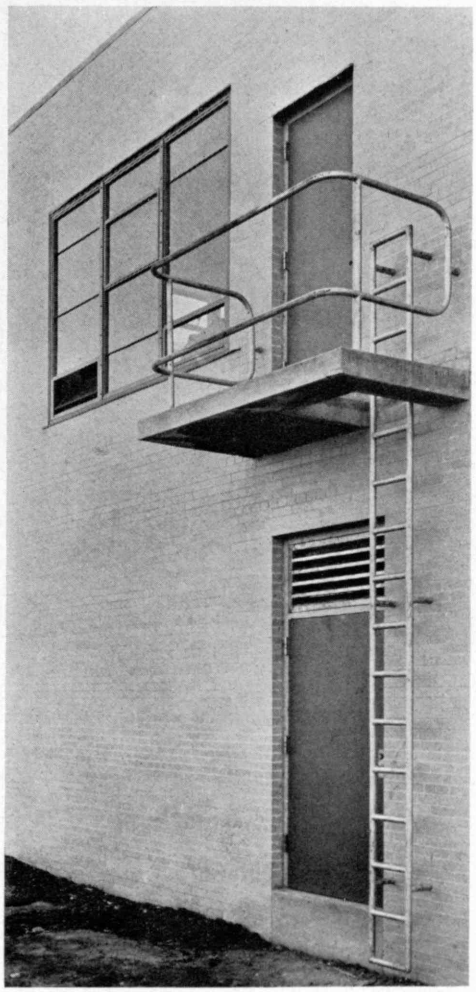
In chemistry, for example, the techniques of nuclear physics have enabled scientists to follow and study by the so-called tracer method complex reactions they could not otherwise investigate. This tracer technique, by which components of the reactions are made artificially radioactive so that they can be easily detected, has also proved invaluable to biologists studying intricate life processes: Radioactive iodine has helped the study of thyroid diseases immeasurably; radioactive iron has given clues to anemia; radioactive sulphur has shed light on how the body uses vitamin B_1. Many of these studies obviously hold significant implications for medicine. Nuclear physics has also made its contributions to metallurgy, and its uses in geology, especially in helping to determine the age of the earth, are well known. Possibly the most dramatic applications have been in the field of radiology, where nuclear physics has constituted one of science's most effective weapons against cancer.

Robley D. Evans, Associate Professor of Physics at Technology and chairman of the committee in charge of the conference, said that "the rapidly increasing number of applications of methods and apparatus characteristic of nuclear physics emphasized the usefulness of a joint conference between physicists and their colleagues in other fields of science. The purposes of the conference were to bring together investigators who were widely separated geographically, to provide a forum for the assembling and correlation of present knowledge and problems, and to direct attention toward fundamental lines of research which should be the subject of future investigations."

A feature of the conference was a dinner at which Dr. Compton introduced Professor Enrico Fermi of Columbia University, holder of the Nobel Prize for 1938, who spoke on nuclear fissions.

Among the distinguished scientists who were chairmen of the various technical sessions were James B. Conant, President, Harvard University; Lyman J. Briggs, National Bureau of Standards; Frederick Seitz, Jr., University of Pennsylvania; Samuel C. Lind, '02, University of Minnesota; Charles S. Barrett, Carnegie Institute of Technology; Alfred C. Lane, Tufts College; Hugh S. Taylor, Princeton University; Dr. George W. Holmes, Massachusetts General Hospital; Dr. James H. Means, '06, Massachusetts General Hospital and Harvard University; Leason H. Adams, Carnegie Institution of Washington; Harold C. Urey, Columbia University; Dr. George E. Pfahler, University of Pennsylvania; Dr. Joseph C. Aub, Huntington Memorial Hospital and Harvard University; Kenneth T. Bainbridge, '25, Harvard University; G. Failla, Memorial Hospital, New York City; Dr. Rollin H. Stevens, Detroit, Mich.; Joseph G. Hamilton, University of California; Edith H. Quimby, Memorial Hospital, New York City; Dr. Stafford L. Warren, University of Rochester School of Medicine and Dentistry; Charles Packard, Columbia University; Detlev W. Bronk, Cornell University Medical College; David R. Goddard, University of Rochester; and Robert J. Van de Graaff, M.I.T.

Assisting Professor Evans on the committee in charge were Elmer Hutchisson, '24, University of Pittsburgh, Secretary; Henry A. Barton, director, American Institute of Physics; Edw. U. Condon, Westinghouse Electric and Manufacturing Company; Lee A. DuBridge, University of Rochester; Dr. Failla; Clark Goodman, '40, M.I.T.; Ernest O. Lawrence, the distinguished physicist of the University of California, awarded the Nobel Prize in 1939 for the cyclotron; and Dr. Urey, whose discovery of heavy water won the 1934 Nobel Prize.



M.I.T. Photo

A fire escape can be efficient and at the same time interesting; this one is at the rear of the new Sloan Building.

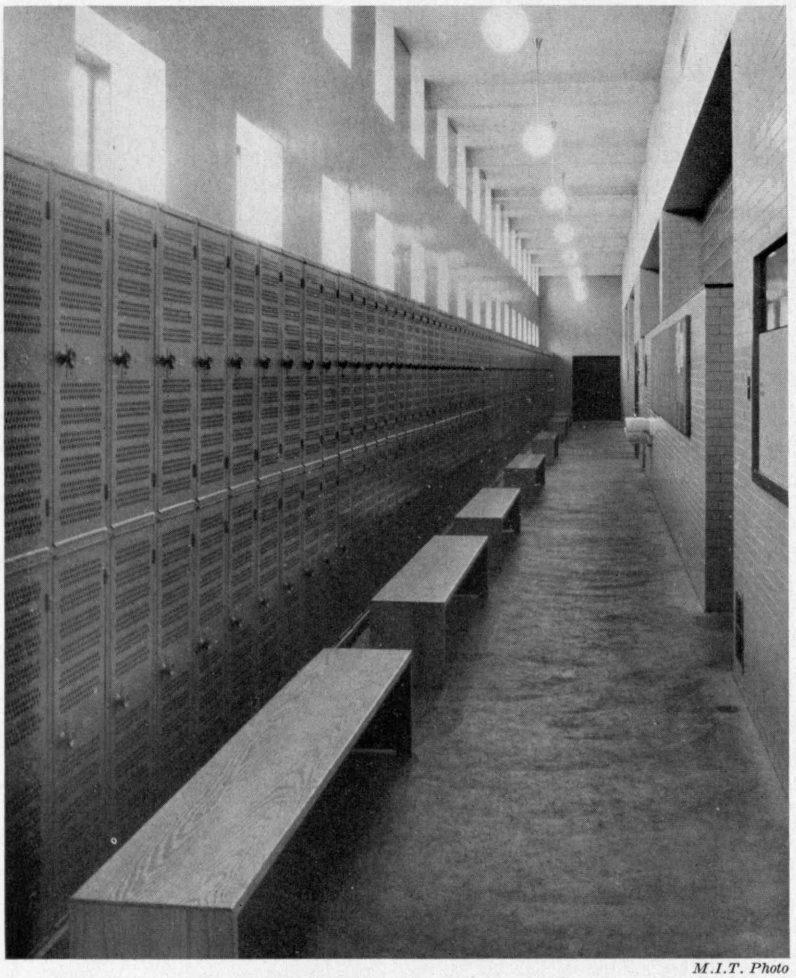
Memorabilia

AN exhibition of Emma Savage Rogers' memorabilia was opened last month in the room at the Institute named for her and

dedicated to the use of Technology women. As the wife of William Barton Rogers, the Institute's first President, Mrs. Rogers shared with him the tribulations and the triumphs of the Institute's early years, and until her death in 1911 her interest in its progress never waned.

The exhibition includes photographs, letters, and several of Mrs. Rogers' gowns. Also on view is a silver tray which was presented to her by the students in the classes from 1865 to 1885 and which, after her death, was given to the Institute by her nieces for use by the wives of Presidents of Technology. The collection also contains copies of books she edited, including the life and letters of her husband, as well as the letters of her father, which she so ably edited at the age of eighty-two. Among the photographs of Mrs. Rogers is a miniature on ivory made when she was about eighteen years old.

The collection was arranged by the exhibits committee of the Emma Rogers Room, which is composed of Mrs. Frederick K. Morris, chairman, Mrs. Walter C. Voss, and Miss Florence W. Stiles, '22.



M.I.T. Photo

Commodious but compact, a locker room adjoining the showers in the new Alumni Pool Building

The Council Resumes

HIGH mark in attendance — 125 members and guests being present — was set at the first meeting of the Alumni Council for this academic year, in Pritchett Hall on the last Monday in October. This was the 215th meeting of the Council. Henry E. Worcester, '97, President of the Alumni Association, was in the chair. After introductions and committee reports, including that of Francis A. Barrett, '24, chairman of the 1940 Alumni Day, whose good work was again commended, Mr. Worcester proceeded to the presentation of President Compton as the first of a group of speakers on aspects of the national defense program.

Talking as a member of the National Defense Research Committee, Dr. Compton sketched the Institute's participation in defense preparations, including the loan of staff members to the government, the conduct of special research at the Institute itself, and the offering of intensive training courses to prepare men for particular functions in defense. Professor George R. Harrison, Director of Applied Physics and of the Research Laboratory of Experimental Physics, who is chairman of the instrument section of the National Defense Research Committee, next described the work being done by his group, recounting various interesting aspects of the canvassing of ideas in connection with defense.

F. Leroy Foster, '25, assistant to the Director of the Division of Industrial Cooperation, then discussed calls for men as the defense program occasions them. Specialized experience has been particularly sought thus far, but as time goes on the specifications are expected to be materially broadened. At least 16,000 trained engineers, according to conservative estimates, will be needed by industry within the next year. Some personnel men of large organizations set the figure far higher. In helping to meet this demand, the Placement Bureau of the Institute is finding the information blanks returned by Alumni about a year ago very useful, Dr. Foster said.

Professor Jerome C. Hunsaker, '12, Head of the Departments of Mechanical Engineering and Aeronautical Engineering, spoke as a member of the National Advisory Committee for Aeronautics, explaining that in aircraft production the chief problem is one of procurement rather than of research, but that research is being continued very thoroughly.

Visiting Committee Report

THE Committee on Museum * met at the Institute for the purpose of making a preliminary survey of the museum layout and exhibits, and of discussing the entire museum situation. A second meeting was devoted

* Members of this Committee for 1939–1940 were William S. Newell, '99, Chairman, Franklin W. Hobbs, '89, Willis R. Whitney, '90, Charles G. Abbot, '94, Robert P. Shaw, '23, Henry B. Allen, and Henry P. Kendall.

to an interesting and fairly thorough discussion of the aims and activities of the Museum and to a tour of inspection of the exhibits.

The Dard Hunter Paper Museum is not only most interesting but of much educational value to the Institute, and the Committee have no suggestions regarding it. The Nautical Museum appears to need more space for its present exhibits as well as for additional ones that probably will be given to the Institute in the near future. This museum could use the adjacent lecture room. The Hobby Shop is a very valuable adjunct to the regular work of the Institute. It needs more space and some additional tool equipment.

The present method of housing exhibits by glass-covered insets in the corridor walls appears to be not only most practical but the best way to handle the situation at the Institute, as technical or scientific exhibits bearing upon the work of any particular Department can thus be placed along the corridors passing through the Department. This policy should be continued.

The Institute appears to have no set plan for the future expansion of its museum work. This Committee believe that a definite method of selecting and procuring exhibits, and of refusing exhibits that may be offered but are not suitable or of any particular value to the work of the Institute, should be established.

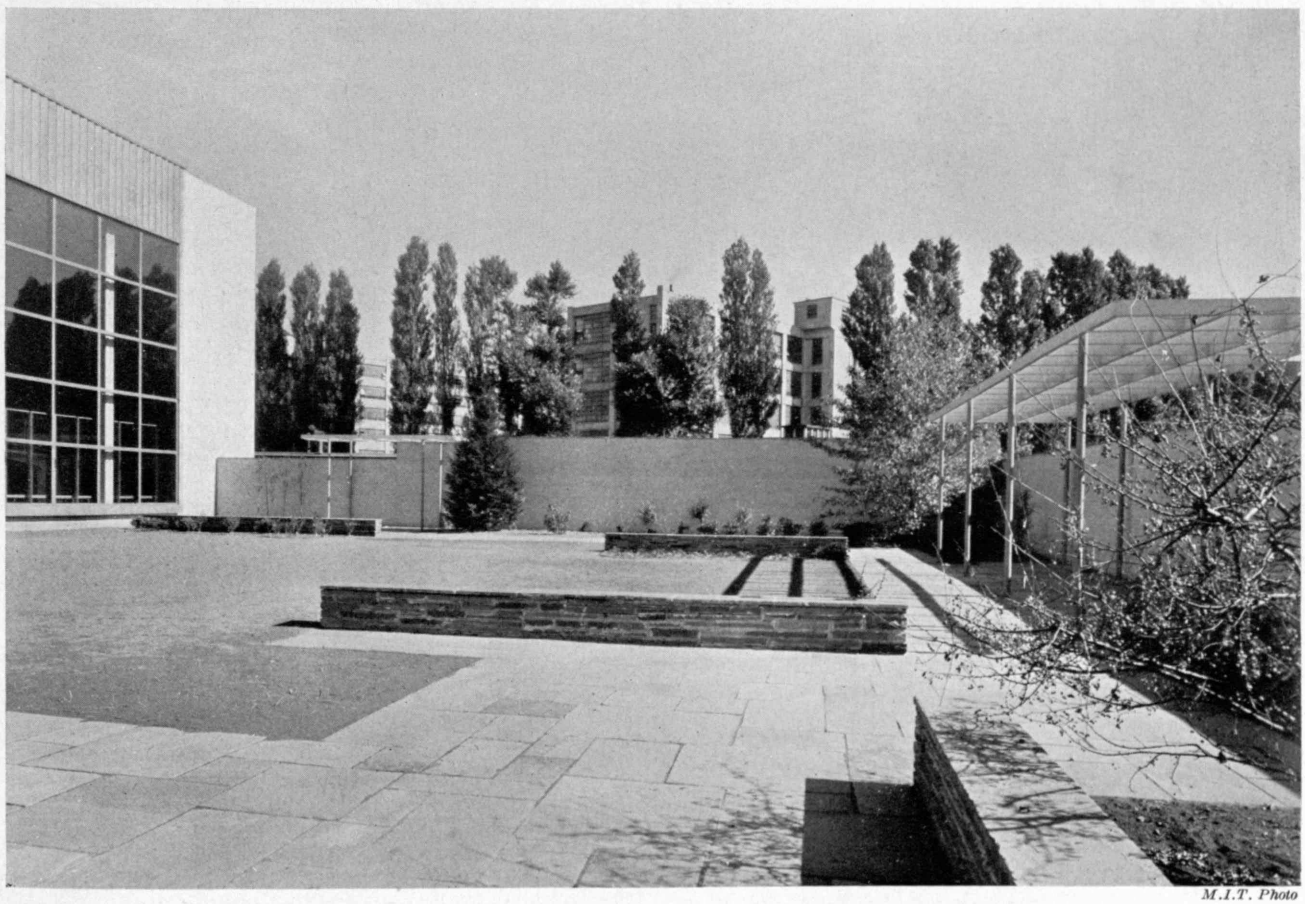
The following questions are suggested as basis for the establishment of such a general policy: Should exhibits be installed for use by students individually or by students with their instructors or by both methods? In addition to carrying out the primary idea of value to the student, should the objective of the museum work be to attract the public, tell the story of the Institute and develop interest in it, or a combination of all of these?

The museum project should be considered as a long-time development — a policy which would have a bearing upon the immediate selection or acceptance of exhibits. With a carefully established plan, each year some exhibits — a few only — can be added which will harmonize with the work of preceding years and that of the years to come. The Committee feel that the historical end should be relatively small, perhaps just touching the high spots of various scientific and industrial developments, and that expansion of exhibits to cover modern developments should be of major concern.

The Committee are indebted to Professor James R. Jack and Arthur C. Watson, Chairman of the Technology Museum, for the time, information, and enthusiastic assistance they have rendered to the Committee.

M.I.T.—A Mexican View

OBSERVATION convinces us that the more the economic potentiality of a country increases, the greater the influence and the scientific support of its universities becomes," says M. Pacheco Moreno, discussing the M.I.T. in a special article in the newspaper



M.I.T. Photo

The Class of 1923 garden in front of the Alumni Pool, as it awaits next spring's burgeoning

El Universal of Mexico City. "This phenomenon," Sr. Moreno holds, "is due to the fact that the industry of a nation, in order to live and develop, must of necessity find in its institutions of higher learning its strongest support; if it fails to do so, the country runs the risk of being invaded by foreign technicians who, even though they come in the name of collaboration, will jealously guard and never reveal to the nationals the secrets of their specialty, leaving local industry from a certain point of view the slave of foreign control and subject to all its eventualities.

"As an objective proof of this statement we are going to discuss the case of the Massachusetts Institute of Technology because it has seemed to us the nearest to our own experience, also because a distinguished Mexican, the engineer Manuel Sandoval Vallarta ['21] has won a prominent place on the staff there — a fact that we consider the best reply to those who do not know nor understand us — and finally because the knowledge of university life in other countries will serve as a mainspring, an example and stimulus to our own."

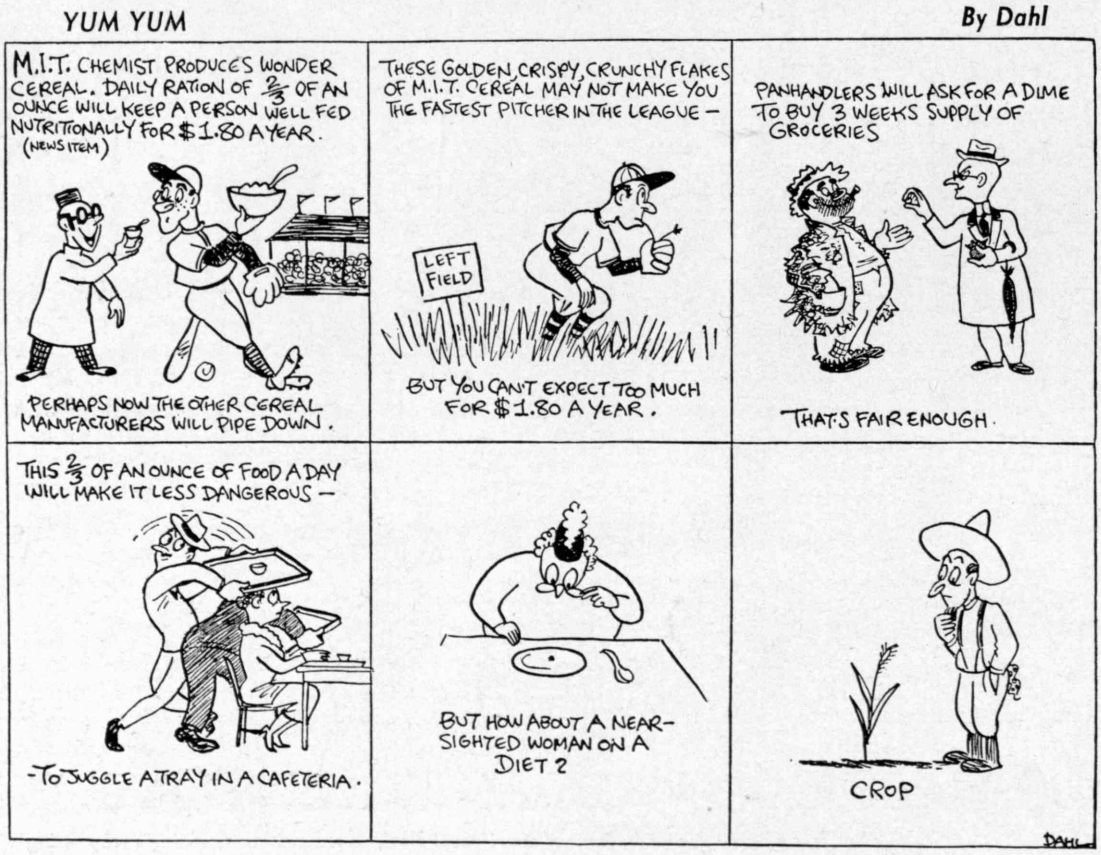
After sketching the origin, history, and present status of the Institute, Sr. Moreno points out: "An institution which in its beginnings was essentially technical, very soon had to establish studies of a purely speculative nature, a necessity which was imposed upon it not only by the increasing industrial progress of the United States and of the world but because nobody now can deny that science must be, and will be, turned to practical uses, and the more so the more disinterestedly it is cultivated; and that if it is neglected, anemia results in the culture of a country and in its technical skill.

"The Institute does not live cut off from the world; all vital forces around it converge to effect its constant advance: The state gives it money and encouragement, realizing that it is training the men the American nation needs, but leaves it absolute liberty in the choice and planning of its activities. The graduates retain their connection with it by bonds of culture and comradeship with an interest which at times manifests itself in material contributions, as, for example, in 1917, when they built the magnificent Walker Building at a cost of many thousands of dollars. Many persons have left it large bequests, even entire estates, some for its support, others for the creation of scholarships for distinguished students or for those who wish to go to other countries for purposes of research. American industrialists appreciate and realize so fully the value of the work accomplished by the Institute that they are continually contributing fabulous sums of money. . . .

"In this way the Institute lives as the best example of co-operation and of liberty, proving that science is not static and petrified but a treasure in a state of evolution, which lends to industrial and manufacturing technique its best support and demands of the student that he investigate, work, and contribute with his truth to the welfare of humanity."

New Food

A FOOD supplying an optimum of all nutritive requirements of the normal person has been developed in the Department of Biology and Public Health by Professor Robert S. Harris, '28, (*Concluded on page 91*)

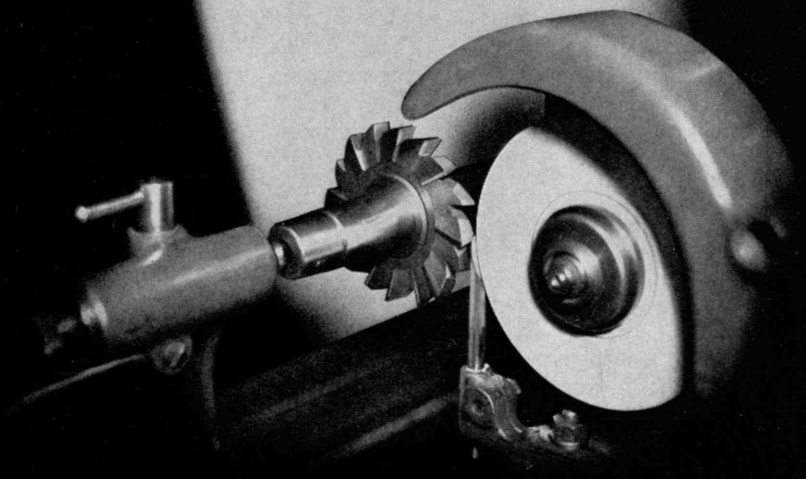


Francis Dahl depicts thus in the Boston Herald *possibilities suggested to his mind by a new food formula.*

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LINGUISTICS AS AN EXACT SCIENCE

(*Continued from page 63*)

According to the third term, which consists of two columns, the word can begin with any consonant of the first column followed by *r*, or with *g*, *k*, *f*, or *b* followed by *l*. The *s* with a wedge over it means *sh*. Thus we have "shred," but not "shled." The formula represents the fact that "shled" is un-English, that it will suggest a Chinese's pronunciation of "shred" or a German's of "sled" (*sl* is permitted by term 7). The Greek theta means *th;* so we have "thread" but not "thled," which latter suggests either a Chinese saying "thread" or a child lisping "sled." But why aren't *tr*, *pr*, and *pl* in this third term? Because they can be preceded by *s* and so belong in term 6. The fourth term similarly means that the word can begin with a consonant of the first column followed by *w*. *Hw* does not occur in all dialects of English; in ordinary spelling it is written backwards, *wh*. If the dialect does not have *hw*, it pronounces the spelled *wh* simply as *w*. *Thw* occurs in a few words, like "thwack" and "thwart," and *gw*, oddly enough, only in proper names, like Gwen or Gwynn. *Kw*, ordinarily spelled *qu*, can have *s* before it and therefore belongs in term 6.

The fifth term indicates that the word may begin with one of the first-column consonants followed by *y*, but only when the vowel of the word is *u;* thus we have words like "hue" (*hyuw*), "cue," "few," "muse." Some dialects have also *tyu*, *dyu*, and *nyu* (e.g., in "tune," "due," and "new"), but I have set up the formula for the typical dialects of the northern United States, which have simple *tu*, *du*, *nu* in these words. The sixth term indicates pairs that can commence a word either alone or preceded by *s*, that is, *k*, *t*, or *p* followed by *r*, also *kw* and *pl* (think of "train," "strain"; "crew," "screw"; "quash," "squash"; "play," "splay"). The seventh term, which means the word can begin with *s* followed by any one of the consonants of the second column, completes the parts of the word that can precede its vowel.

The terms beyond the eighth show what comes after the vowel. This portion is rather more complex than the beginning of the word, and it would take too long to explain everything in detail. The general principles of the symbolism will be clear from the preceding explanations. The ninth term, with its zero, denotes that a vowel can end the word if the vowel is *a* — which means (1) the vowel of the article "a" and the exclamation "huh?" and (2) the vowel of "pa," "ma," and the exclamations "ah!" and "bah!" — or the vowel can end the word if it is the *aw* sound, as in "paw," "thaw." In some dialects (eastern New England, southern United States, South British) the vowel ending occurs in words which are *spelled* with *ar*, like "car," "star" (*ka*, *sta*, in these dialects), but in most of the United States dialects and in those of Ireland and Scotland these words end in an actual *r*. In eastern New England and South British dialects, but not in southern United States, these words cause a linking *r* to appear before a vowel beginning a following word. Thus for "far off" your Southerner says *fa of;* your Bostonian and your Britisher say *fa rof*, with a liquid initial *r;* but most of the United States says *far of*, with a rolled-back *r*. For some dialects, term 9 would be different, showing another possible final vowel, namely, the peculiar sound which the Middle Westerner may notice in the Bostonian's pronunciation of "fur," "cur" (*fə*, *kə*) and no doubt may find very queer. This funny sound is common in Welsh, Gaelic, Turkish, Ute, and Hopi, but I am sure Boston did not get it from any of these sources.

Can one-syllable words end in *e*, *i*, *o*, or *u*? No, not in English. The words so spelled end in a consonant sound, *y* or *w*. Thus, "I," when expressed in formula pattern, is *ay*, "we" is *wiy*, "you" is *yuw*, "how" is *haw*, and so on. A comparison of the Spanish *no* with the English "No!" shows that whereas the Spanish word actually ends with its *o* sound trailing in the air, the English equivalent closes upon a *w* sound. The patterns to which we are habituated compel us to close upon a consonant after most vowels. Hence when we learn Spanish, instead of saying *como no*, we are apt to say *kowmow now;* instead of *si*, we say our own word "see" (*siy*). In French, instead of *si beau*, we are apt to say "see bow."

Term 10 means that *r*, *w*, or *y* may be interpolated at this point except when the interpolation would result in joining *w* and *y* with each other. Term 11 means that the word may end in any single English consonant except *h;* this exception is most unlike some languages, e.g., Sanskrit, Arabic, Navaho, and Maya, in which many words end in *h*. The reader can figure out terms 12, 13, and 14 if he has stuck so far. A small *c* means *ch* as in "child"; *j* is as in "joy." Term 13, which contains these letters, expresses the possibility of words like "gulch," "bulge," "lunch," and "lounge." Term 14 represents the pattern of words like "health," "width," "eighth" (*eytθ*), "sixth," "xth" (*eksθ*). Although we can say "nth" power or "fth" power, it takes effort to say the unpermitted "sth" power or "hth" power. "Hth" would be symbolized **eycθ*, the star meaning that the form does not occur. Term 14, however, allows both *mθ* and *mpf*, the latter in words like "humph" or the recent "oomph" (*umpf*). The elements of term 15 may be added after anything — the *t* and *s* forms after voiceless sounds, the *d* and *z* after voiced sounds. Thus, "towns" is *tawnz*, with *wnz* attained by term 10 plus 11 plus 15; whereas "bounce" is *bawns*, with *wns* by 10 plus 12. Some of the combinations resulting in this way are common; others are very rare but still are possible English forms. If Charlie McCarthy should pipe up in his coy way, "Thou oomphst, dost thou not?"; or a Shakespearean actor should thunder out, "Thou triumphst!" the reason would be that the formula yields that weird sputter *mpfst* by term 14 plus term 15. Neither Mr. Bergen nor Mr. Shakespeare has any power to vary the formula.

The overriding factor applicable to the whole expression is a prohibition of doubling. Notwithstanding whatever the formula says, the same two consonants cannot be juxtaposed. While by term 15 we can add *t* to "flip" and get "flipt" ("flipped"), we can't add *t* to "hit" and get "hitt." Instead, at the point in the patterns where "hitt" might be expected, we find simply "hit" (I hit it yesterday, I flipt it yesterday). Some languages, such as Arabic, have words like "hitt," "fadd," and so on, with both paired consonants distinct. The Creek Indian language permits three, e.g., *nnn*.

The way the patterns summarized in this formula control the forms of English words is really extraordinary. A new monosyllable turned out, say, by Walter Winchell or by a plugging adman concocting a name for a new breakfast mush, is struck from this mold as surely as if I pulled the lever and the stamp came down on his brain. Thus linguistics, like the physical sciences, confers the power of prediction. I can predict, within limits, what Winchell will or won't do. He may coin a word "thrub," but he will not coin a word "srub," for the formula cannot produce a *sr*. A different formula indicates that if Winchell invents any word beginning with *th*, like "thell" or "therg," the *th* will have the sound it has in "thin," not the sound it has in "this" or "there." Winchell will not invent a word beginning with this latter sound.

We can wheeze forth the harshest successions of consonants if they are only according to the patterns producing the formula. We easily say "thirds" and "sixths," though "sixths" has the very rough sequence of four consonants, *ksθs*. But the simpler "sisths" is against the patterns and so is harder to say. "Glimpst" (glimpsed) has *gl* by term 3, *i* by 8, *mpst* by 12 plus 15. But "dlinpfk" is eliminated on several counts: Term 3 allows for no *dl*, and by no possible combination of terms can one get *npfk*. Yet the linguist can say "dlinpfk" as easily as he can say "glimpsed." The formula allows for no final *mb*; so we do not say "lamb" as it is spelled, but as *lam*. "Land," quite parallel but allowed by the formula, trips off our tongues as spelled. It is not hard to see why the "explanation," still found in some serious textbooks, that a language does this or that "for the sake of euphony" is on a par with nature's reputed abhorrence of a vacuum.

The exactness of this formula, typical of hundreds of others, shows that while linguistic formulations are not those of mathematics, they are nevertheless precise. We might bear in mind that this formula, compared with the formulation of some of the English (or other) grammatical patterns that deal with meaning, would appear like a simple sum in addition compared with a page of calculus. It is usually more convenient to treat very complex patterns by successive paragraphs of precise sentences and simpler formulas so arranged that each additional paragraph presupposes the previous ones, than to try to embrace all in one very complex formula

Linguistics is also an experimental science. Its data result from long series of observations under controlled conditions, which, as they are systematically altered, call out definite, different responses. The experiments are directed by the theoretic body of knowledge, just as with physics or chemistry. They usually do not require mechanical apparatus. In place of apparatus, linguistics uses and develops *techniques*. Experimental need not mean quantitative. Measuring, weighing, and pointer-reading devices are seldom needed in linguistics, for quantity and number play little part in the realm of pattern, where there are no variables but, instead, abrupt alternations from one configuration to another. The mathematical sciences require exact measurement, but what linguistics requires is, rather, exact "patternment" — an exactness (*Continued on page 82*)

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LINGUISTICS AS AN EXACT SCIENCE

(*Continued from page 81*)

of relation irrespective of dimensions. Quantity, dimension, magnitude, are metaphors since they do not properly belong in this spaceless, relational world. I might use this simile: Exact measurement of lines and angles will be needed to draw exact squares or other regular polygons, but measurement, however precise, will not help us to draw an exact circle. Yet it is necessary only to discover the principle of the compass to reach by a leap the ability to draw perfect circles. Similarly, linguistics has developed techniques which, like compasses, enable it without any true measurement at all to specify *exactly* the patterns with which it is concerned. Or I might perhaps liken the case to the state of affairs within the atom, where also entities appear to alternate from configuration to configuration rather than to move in terms of measurable positions. As alternants, quantum phenomena must be treated by a method of analysis that substitutes a point in a pattern under a set of conditions for a point in a pattern under another set of conditions — a method similar to that used in analysis of linguistic phenomena.

Physics and chemistry, dealing with inanimate matter, require chiefly inanimate apparatus and substances for their experiments. As conducted today upon a large scale, they require highly wrought physical equipment at every step, immense investments in physical plant. Their experiments are costly to conduct, both absolutely and relatively to the number of scientists. Experimental biology uses much inanimate apparatus, too, but its fundamental apparatus is its experimental animals and plants and their food, housing, and growth facilities. These also are expensive in the quantities needed. No one grudges the expense, either here or in the physical sciences, so long as an increase in human knowledge and welfare is promised.

The apparatus of linguistics is much less expensive than that of these sciences, but it, too, costs money. The experimental linguist, like the biologist, uses and must have experimental animals. Only, his "animals" are human. They are his informants and must be paid for working with him. Sometimes he must make trips to Indian reservations or African villages where his informants live; at other times it is more economical to transport them to him. They provide the field for experimental investigation. They are apparatus, not teachers. It is as important to study in this way languages of Indians, Africans, and other aborigines as it is to study the English dialects of Brooklyn, Boston, Richmond, or London.

While informants are the basic apparatus, the linguist can improve and speed up his work with the aid of mechanical tools, just as the biologist studies his animals and plants with the aid of microscopes, x-ray machines, and other costly instruments. The linguist is aided by judicious use of good phonographic reproducing devices. Much could also be done with the help of business machines.

Although linguistics is a very old science, its modern experimental phase, which stresses the analysis of unwritten speech, could be called one of the newest. So far

as our knowledge goes, the science of linguistics was founded, or put on its present basis, by one Panini in India several centuries before Christ. Its earliest form anticipated its most recent one. Panini was highly algebraic, i.e., pattern symbolic, in his treatment; he used formulas in a very modern way for expressing the obligatory patterns of Sanskrit. It was the Greeks who debased the science. They showed how infinitely inferior they were to the Hindus as scientific thinkers, and the effect of their muddling lasted two thousand years. Modern scientific linguistics dates from the rediscovery of Panini by the Western world in the early Nineteenth Century.

Yet linguistics is still in its infancy so far as concerns wherewithal for its needed equipment, its supply of informants, and the minimum of tools, books, and the like. Money for mechanical aids, such as I referred to above, is at present only a happy dream. Perhaps this condition results from lack of the publicity the other sciences receive and, after all, fairly earn. We all know now that the forces studied by physics, chemistry, and biology are powerful and important. People generally do not yet know that the forces studied by linguistics are powerful and important, that its principles control every sort of agreement and understanding among human beings, and that sooner or later it will have to sit as judge while the other sciences bring their results to its court to inquire into what they mean. When this time comes, there will be great and well-equipped laboratories of linguistics as there are of other exact sciences.

FLYING UP

(*Continued from page 65*)

ground without any forward run and could keep it in the air indefinitely with satisfactory control. It was able to fly backward, sideways, or forward, could make turns at any desired radius, and could be turned completely about in the air while remaining directly over one spot. Enough thus has been done to prove that controlled vertical flight is possible.

Other experimenters have been working along similar lines but with indifferent success. Toward the end of the World War two Austro-Hungarians, Lieutenant Stefan Petroczy and Professor Theodore von Kármán, developed a machine to replace kite balloons as a means of observation. They actually built a helicopter which had a gross weight of about 3,200 pounds and was powered with three 120-horsepower rotary engines. It carried one observer and a machine gun in a tanklike enclosure on top, and enough fuel for a flight of one hour. It was never allowed to fly freely, but was attached to stabilizing ropes. After fifteen successful flights, it was finally damaged badly in a landing and was abandoned. Although the machine had demonstrated a certain degree of value from the military angle, it lacked any means of propelling itself from point to point in the air.

The world was still taking large grains of salt with reports that a couple of bicycle mechanics named Wright had a flying machine that really flew, when another inventor in America began jotting down notes and making sketches on the backs of old (*Continued on page 84*)

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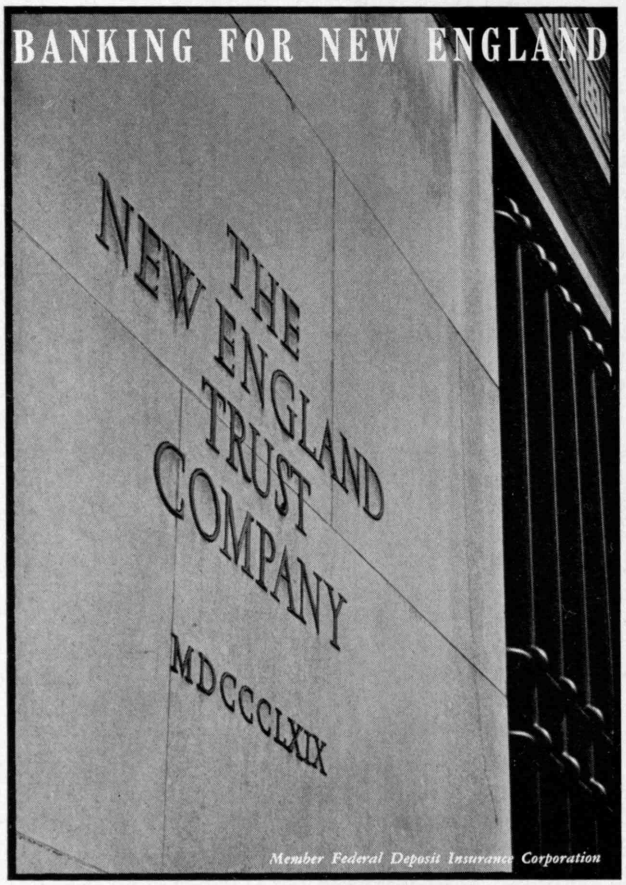
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FLYING UP

(*Continued from page 83*)

envelopes. Emile Berliner of Washington was no novice at invention. The gramophone and a number of other devices now commonplace had been born of like scraps of paper carried about in the Berliner coat pockets. As early as 1902 he had built and tested a five-cylinder rotary gasoline engine. Not unnaturally, then, this flying business caught his fancy. But he thought that the boys in Dayton were off on the wrong foot. The way to fly was straight up; the proper machine was the helicopter.

He tried it — persistently. For a while he collaborated with J. Newton Williams, who had been experimenting with helicopters for some years. Williams had worked with Glenn Curtiss at Hammondsport, N. Y. Berliner and Williams built a machine together in 1909, after having tested the lifting power of their airscrews during 1908. An accident put an end to the Berliner-Williams machine but did not quench Emile's enthusiasm. No work was done, however, between 1909 and 1919. At the latter date Henry, Emile's son, having learned to fly while in the United States Army Air Corps, took over active work, and his father backed him financially. Henry did succeed in building a machine (his second, now in the Smithsonian Institution) which was probably the first helicopter to achieve dirigibility. Stability and other problems proved more difficult. By 1923, however, having built and test-flown three other full-size machines, the Berliners gave up "helicopting" as a bad job, and turned their attention to other activities.

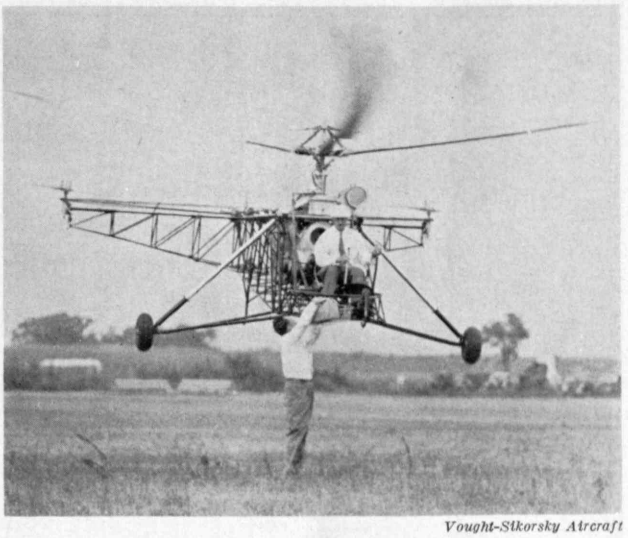
About the same time, a Russian engineer, De Bothezat, persuaded the United States Army Air Corps to build at McCook Field, Dayton, Ohio, a huge and awkward-looking machine with four six-bladed lifting airscrews driven by a 220-horsepower engine. This machine weighed 3,600 pounds complete, and when tested by the technical section at Dayton in mid-December of 1922 it rose to an altitude of about six feet and stayed in the air for not quite two minutes. It did, however, exhibit considerably greater stability in flight than Berliner machines. The results obtained at that time were not striking enough to warrant continuing the project, and the Air Corps lost interest. According to report, De Bothezat was designing another machine for a military competition when he died early this year.

Certain European governments were not so easily discouraged about helicopters. Etienne Œmichen of the Peugot Company of France experimented continuously after the close of the War in 1918 and built several machines, one of which depended for part of its lift and much of its stability on an attached gas-filled balloon. The most successful (which, however, was minus any balloon) set a record in 1924 by flying a closed kilometer circuit, with an all-up weight of 4,400 pounds and 120-horsepower engine. This machine made a total of over a thousand flights, but never got more than a few feet off the ground. Another Frenchman, Louis Breguet, who built a famous line of bombing planes during 1917 and 1918, experimented with helicopters long before the War, beginning in 1907. He continued work on direct-lifting machines and made a number of different

types culminating in a machine which was demonstrated during the post-War period. His most successful machine made a number of closed-circuit flights at low altitudes, but its stability left much to be desired.

In America, the Curtiss Aeroplane and Motor Corporation became interested in the idea of one of its own engineers, Maitland B. Bleecker. Bleecker's helicopter had four winglike blades, each with its own stabilizing surfaces, rotating about the vertical axis of the machine. Each of these four airplanelike elements was driven by its own propeller, gear-connected to an air-cooled radial engine. It made several "flights" inside the hangar at Valley Stream Airport where it was built. With the onset of the depression of 1930, however, and in view of difficulties that were cropping up both in the ability to cool the engine and in matters of stability, the Curtiss Corporation saw fit to drop the whole project without carrying out any very conclusive tests.

For almost ten years little was heard of the helicopter in America. Engineers were kept busy with the rapid development of the airplane and seemed to have little energy left for problems of vertical flight. In Germany, however, designers had been quietly at work. Without advance notice it was suddenly announced, in 1937, that the Focke-Achgelis Company had built a successful helicopter, one that conformed to all the desirable specifications for such machines. It was reported able to rise and to ascend vertically, to hover, to move ahead, astern, or sideways at the will of the pilot. Some understandable skepticism existed in this country over the first reports, but they were dispelled by repeated demonstration. Stimulated by the reported success of the German helicopter, toward the end of the 1930's, several small groups of engineers in the United States began independent simultaneous studies. In 1938, Representative Dorsey of Pennsylvania introduced a bill in Congress to appropriate $2,000,000 for the development of rotary-wing aircraft for all government agencies. Of this amount, the Army was authorized to expend $300,000 for research on autogiros or helicopters.



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BORING HISTORY

(*Continued from page 67*)

cently, it was the best drilling instrument for small holes, such as the firing vent of cannon. Such a drill had a flat steel bow, but cruder forms were bow shaped only, as shown in Fig. 9.

The pump drill (Fig. 10) is an efficient device for drilling holes less than an eighth of an inch in diameter. It has been invented independently by various races, including our American Indians. The monk Theophilus, who wrote a treatise on various tools and methods about 1100, says: "Pearls . . . are perforated with a fine steel tool fixt in wood. It has a small wheel and there is another piece of wood in which it (the drill) turns, to which the cord is attached to make it turn." No bow is mentioned. The "wheel" is evidently the flywheel, and the "piece of wood," the crossbar in which the shaft turns and to which the driving cord is attached. It is called a pump drill on account of the pumping, or up-and-down, motion of the crosspiece. It can be rotated at a higher speed than the common geared hand drill, and for holes less than one-sixteenth of an inch in wood and in iron it is very efficient. It has a positive and not a friction drive, and the downward thrust of the arm supplies not only the speed but the pressure.

Any of these drill-driving devices can be applied to either flint-tipped drillshafts or to grinding methods for hard stones. Regardless of the driving devices, or whether the shaft was rolled between the palms, beads and other ornaments have been pierced by lapping out the hole. Precious stones are pierced today by this method. The dies through which the smaller sizes of wire are drawn are made of diamonds and sapphires because they hold their size well. To pierce these small holes, an iron wire is rolled in diamond dust and rotated at a very high speed in contact with the stone to be drilled. Prehistoric and primitive men have accomplished the same results with less apparatus, at a greater cost of time and labor.

Holes produced by these methods are relatively small — not over two inches in diameter — but earlier mention has been made of larger holes drilled in solid rock. For examples of these we must go to Egypt. There is no doubt of the existence of these holes, some of which are over four inches, nor does there seem to be any doubt that similar holes were drilled (*Concluded on page 88*)

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BORING HISTORY

(*Concluded from page 86*)

with core drills, as the cores have been found. Flinders Petrie, the famous English archaeologist and Egyptologist, mentions several examples of such drilling. For instance, he refers to a 4½-inch hole drilled in diorite, showing the marks of a single cutting point which made seventeen complete revolutions. A piece of diorite "waste" — a core? — of about the same size was also found. He further says that the drill used in hollowing out the granite coffin in the great pyramid was 4.2 inches in diameter and states: ". . . All over the platform [at El Bersheh], the surface is apparently covered with the circular grooves of large tubular drills about 18 inches diameter." * Petrie held that the Egyptians used core, or tubular, drills set with precious stones, but not all his fellow members agreed on this particular detail. They did not dispute his contention that the holes were drilled with tubular drills, but they did not accept Petrie's reconstruction of the methods by which the drilling was accomplished. Possibly Petrie was convinced that some of the criticisms were just, as he has not — so far as I know — referred to the subject again. There seems to be no doubt that the holes, or some of them, were drilled with core drills, but how these drills were constructed or driven is still an open question.

* *Journal of the Anthropological Institute of Great Britain and Ireland*, XIII, 94.

NET RETURNS FROM THE BANKS

(*Continued from page 72*)

from an average of three hundred thousand to one of about thirty thousand. Chief quick-freezing methods are: first, direct freezing by immersion in a sodium chloride brine; second, indirect immersion or spraying with calcium chloride brine; third, the single plate system, whereby the article to be frozen is placed on a metal plate, the under side of which is in contact with calcium chloride brine; fourth, freezing between two metal surfaces under pressure. The latter method involves placing the fish fillets on a flexible belt which is run into the freezing tunnel. An upper belt presses against the fillet, and the two belts travel through the freezing zone, where calcium chloride brine is sprayed on the under surface of the lower belt and on the upper surface of the upper belt. Out of this method was developed the multiplate froster — a series of refrigerated, aluminum-alloy plates with passages through which the refrigerant is circulated. The plates are enclosed in an insulated cabinet which has sliding doors for quick loading and unloading. With the plates at 25 degrees Fahrenheit, unpackaged fish fillets and steaks freeze in from five to ten minutes.

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Donald K. Tressler, chief chemist of the General Seafoods Corporation, says that with the increasing markets for quick-frozen fish, our fishermen will soon have to go to grounds a thousand miles or more from their home ports. He prophesies that floating freezing plants will remain at sea for several months at a time, acting as mother ships for the trawlers that actually bag the fish.

MAIL RETURNS

(*Concluded from page 50*)

carry the same sense if written: "The more complex and strange the subject, the more difficult and important it is to write about it simply and clearly"?

Or: "Such instinctive conclusions, which teach the reader nothing, are a consequence partly of the socially beneficial industrial utilization of the results of research and partly of that egocentricity which is the less attractive aspect of American individualism."

Or: "The philosophical import of scientific discovery, whether that be in a further expansion of an expanding universe or in a further reduction of ultramicroscopic infinitesimality, works powerfully upon the mystical."

Or: "A piece of popularization so constructed is far superior in social value to writing which seeks through what Professor Frederick G. Keyes calls 'imagination shock' to jolt the reader by means of a concatenation of superlatives and strings of astronomical figures."

If this article is not a concatenation of superlatives and a string of astronomical words, what is it? The article "Rooms for Listening," which appears in the same issue, is interesting, instructive, easy to read and to understand. It illustrates the style which "The Layman's Science" would have one follow. What a contrast!

I quote from "On the Improvement of the Mind" by Isaac Watts, D.D., written about 1740: "Some persons have been led by education into a dark and unintelligible way of thinking and speaking; and this continues with them all their lives, and clouds and confounds their ideas: perhaps some of these may have been blessed with a great and comprehensive genius, with sublime natural parts, and a torrent of ideas flowing in upon them; yet for want of clearness in the manner of their conception and language, they sometimes drown their own subject of discourse, and overwhelm their argument in darkness and perplexity."

Although one of Watts's directions on "an instructive style" is that one "acquire a variety of words — a 'copia verborum,'" the above quotation suggests the possibility of a disease "maxima copia 'verborumitis.'" This last word is coined for good luck.

The Review is good. Don't slip. Make it better.

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MOTOR NECROLOGY

(*Continued from page 69*)

highway marking, better traffic regulation, elimination of grade crossings, use of clover-leaf intersections, stop signs, one-way streets, improved highway and car lighting, segregation of traffic, motor-vehicle inspection, compulsory insurance, educational programs, better automobiles, and so on without end. Although one shudders to think what the toll would have been without this work, one reluctantly turns to the conclusion that the answer to the problem does not lie in that direction. The evidence fairly screams that motor travel is continually pressing the bounds of its physical limitations and consistently, year after year, exceeding its human limitations. According to "Smash Hits of the Year," an entertaining little pamphlet broadcast by the Travelers Insurance Company, driver actions resulting in death in 1939 were classified as follows:

	Per cent of deaths
Exceeding speed limit	36.5
Reckless driving (within legal limit)	14.7
Drove off roadway	11.6
Passing on curve or hill	1.5
Cutting in	1.6
Passing standing street car	.2
	66.1
On wrong side of road	14.6
Did not have right of way	13.5
Passing on wrong side	1.0
Failed to signal and improper signaling	1.3
Car ran away — no driver	.2
Miscellaneous	3.3
	100.0

Speed was a factor in at least two-thirds of all deaths, and high velocity the cause of more than one-third.

A still further indication of the importance of speed is to be seen in the Travelers' analysis of the direction of travel of cars involved in fatal (*Continued on page 90*)

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MOTOR NECROLOGY

(*Continued from page 89*)

accidents. A large majority of such cars were not turning, backing, skidding, or standing still, but going straight ahead or slowing down (85.7 per cent of all deaths).

Within the total of motor necrology, changes are taking place, but they are mostly in the wrong direction. Victor W. Killick, chief of the bureau of statistics of the California Department of Motor Vehicles and a pioneer student of traffic problems, describes these trends by pointing out that the 60-70-80-miles-per-hour crashes are increasing in number; that the 100-miles-per-hour crash has arrived; and that within a short time we shall be hearing of the 120-miles-per-hour crash. The multi-death accident and the multicar accident, he concludes, are the latest aspects of the traffic problem.

On highways where there is a large, high-speed traffic flow, Killick observes, following cars may pile into a crash, compounding the accident; as many as fourteen cars have been involved in such a shambles. In former days, fatalities were chiefly of pedestrians. Literally, it was safer to ride than to walk; car collisions produced numerous injuries but few fatalities. Later, at higher speeds, a single death would occur and perhaps all passengers would be injured. In more recent high-speed crashes, however, impact forces are so terrific that a passenger has little chance to survive. "The multideath accident," Killick asserts, "is heavily responsible for the present skyrocketing of traffic fatality counts."

What can we do about it? We can of course continue to improve roads, cut down grades, reduce curves, increase visibility; we can continue to improve the mechanism of the automobile itself. But experience indicates that improvements of this sort are, after all, only palliatives. It seems to me, therefore, that we may find ourselves ultimately faced with the necessity of imposing some kind of universal restraint upon John Citizen when he gets behind the wheel of the family car for the Sunday afternoon spin. Two means of securing that restraint suggest themselves: the one mechanical; the other psychological, not to say spiritual.

The mechanical means is the automatic speed governor. The governor has fortunately been tried for some time, so that the results to be expected from universal adoption of it can be accurately forecast. A recent survey of opinion among 180 owners of motor fleets located in thirty-five states and operating some 50,000 vehicles found that no one who had voluntarily adopted the governors wanted to remove them. The device was declared to reduce accidents, according to 108 of the 180 owners; reductions in insurance costs up to 40 per cent were noted. Some of the installations appear to have been made primarily for economic advantages, but the effectiveness of the governor as a safety device in reducing accidents was almost universally acknowledged.

Rather interesting is the comment that the use of governors will have close consideration as a means of conserving rubber and oil consumption in time of war. Rubber offers one of the most difficult problems in the whole list of strategic materials, and its use is inseparably connected with automobiles and their speed of travel. The savings in human life and the economies in

operation, secondary considerations in war, would certainly be found worth keeping in the piping days of peace.

The spiritual, or psychological, means of enforcing universal restraint would ideally be to have John Citizen do his driving from the front bumper or the radiator cap of his car and thus to remove from him the seeming bulwark of overelongated hood and resonantly thrumming motor which now precede him in his mad dash down the highway. Several automobile manufacturers have experimented with rear-engined cars. One of the reasons they will not bring out such cars is the feeling of exposure to risk experienced by the driver when nothing is between him and what he might hit, in contrast to the sense of security he feels in the conventional car with the engine to take the brunt of the blow. These impressions are wholly illusory; the inertia of the occupant's body is the physical source of the human damage, and the inertia is the same in either case. From a safety standpoint, important advantages might be gained from putting the driver up front: He would be closer to the scene of a possible accident and in better time to avoid it; hundredths of a second are not to be despised. He would also, for his very fear — and fear is the emotional ingredient of caution — be in better emotional balance. The forward position would act in some degree as an automatic speed governor, through psychological channels.

THE INSTITUTE GAZETTE

(*Concluded from page 78*)

and Herbert B. King, '40, who made the project the subject of his thesis. The formula was established after a study of the various nutritive elements missing from the diet of the low-income group of the country's population. The food is composed of cereals, including wheat, corn, oats, and soya-bean meal, to which are added the required amounts of various minerals and concentrates. Energy and water requirements are supplied generally by even the poorest American diets. The new food cares for nutritional needs which often are not met by the average unbalanced menu. Vitamin C, which is not included in the formula, could be supplied by a daily ration of four ounces of tomato juice. The estimate that this food could be prepared at a cost per person of $1.80 a year aroused wide interest. Even the cartoonists found the subject appropriate.

THE TREND OF AFFAIRS

(*Concluded from page 60*)

L. Guzewicz, '32; Robert Ebenbach, '34; Rupen Eksergian, '14; Malcolm S. Hird, '26; and James M. Austin, Margaret Whitcomb, '39, and Delbar P. Keily, '34, of the Department of Meteorology. Various special problems were considered by Professors Charles W. MacGregor and Earle Buckingham, both of M.I.T.





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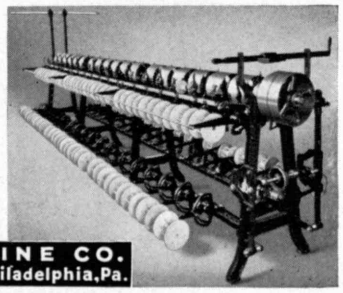
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A WORD TO THE WISE

At the present time the Placement Bureau is faced with the problem of trying to meet a continually growing demand for qualified technical and engineering personnel with a continually dwindling supply.

The Bureau has no desire to move any of the Alumni who are now performing important jobs, but would like to stress that the next few months probably will offer an unusual opportunity for experienced men to find positions of maximum usefulness.

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Honor

¶ To SAMUEL C. PRESCOTT '94, re-elected president of the Institute of Food Technologists at the first annual meeting, Chicago, June 17.

¶ To GEORGE K. BURGESS '96, by the posthumous establishment of the George K. Burgess Memorial Award Lecture of the Washington chapter of the American Society for Metals. The recipients will be limited to persons who have distinguished themselves in metallurgy.

¶ To HAROLD S. OSBORNE '08 and VANNEVAR BUSH '16, elected to the board of directors of the American Institute of Electrical Engineers for 1941, and to JOSEPH W. BARKER '16, elected vice-president.

¶ To CHARLES EDISON '13, elected governor of New Jersey.

¶ To LOUIS WEISBERG '15, elected president of the Association of Consulting Chemists and Chemical Engineers, Inc., for 1941.

¶ To ARTHUR TYNDALL '24, appointed judge of the Arbitration Court of New Zealand.

¶ To ERNST A. HAUSER, staff, appointed to the board of overseers of the Browne and Nichols School, Cambridge, until the autumn of 1942.

¶ To LINUS C. PAULING, former staff, awarded the 1941 William H. Nichols Medal of the New York section of the American Chemical Society, to be presented at a dinner on March 7.

In Print

¶ HARRY J. CARLSON '92, on behalf of his architectural firm, presenting the keys of a new Bates dormitory to President Gray, pictured in the *Bates College Bulletin*.

¶ EDWARD E. BUGBEE '00, author of the third edition of *A Textbook of Fire Assaying*, Wiley.

¶ ROBERT B. SOSMAN '04, author of *Pyometry of Solids and Surfaces*, American Society for Metals.

¶ JOHN C. KINNEAR '07, subject of a biographical sketch in *The Explosives Engineer*, September.

¶ LEWIS W. WATERS '10, author of "Industrial Research in Your Own Business," *Dun's Review*, September.

¶ TENNEY L. DAVIS '13, new associate editor of *The Journal of Chemical Education*.

¶ DONALD W. DOUGLAS '14, subject of a biographical sketch in *Scientific American*, July.

¶ VANNEVAR BUSH '16 and WILLIAM H. TIMBIE, staff, authors of the third edition of *Principles of Electrical Engineering*, Wiley.

¶ EARNSHAW COOK '22, author of *Open Hearth Steel Making*, American Society for Metals.

¶ WILLIAM P. ALLIS '23, author of a review of S. Chapman's and T. G. Cowling's book *The Mathematical Theory of Non-Uniform Gases*, Macmillan, in *Science*, June 14.

¶ JOHN E. BURCHARD '23, with the help of HARRY M. WEESE '38, WILLIAM E. HAIBLE '39, MARGARET C. HOPKINS, staff, and DAVID MAYER, staff, author of *A Method for Analizing the Economic Distribution of Shelter*, Bemis Foundation.

¶ HOWARD H. DAWES '23, author of "Notes on the Care and Maintenance of General Radio Instruments," *General Radio Experimenter*, September–October.

¶ ARTHUR J. KEMP '24, subject of the "Who's Who in Radio" column of the New York *Radio Daily*, October 10.

¶ FREDERICK K. MORRIS, staff, author of a review of J. S. Lee's *The Geology of China*, Nordemann, in *Science*, October 4.

Wisdom

¶ By Technology men at the University of Pennsylvania Bicentennial Conference, September 16 through 20: CHARLES G. ABBOT '94, on "Periodicities in Solar Variation Reflected in Weather"; CHARLES-EDWARD A. WINSLOW '98, on "The Future — Problems and Trends" of the university and public health statesmanship; FRANK B. JEWETT '03, on "Engineering Progress and the Social Order"; NORMAN L. BOWEN '12, on "Physical Controls in Adjustments of the Earth's Crust"; RICHARD M. FIELD '15, Chairman of the geological section "The Geo-Physical and Paleontological Problems in Shiftings of Sea Floors and Coast Lines"; JOHN E. BURCHARD '23, on "The Effect of Economics on the Arts"; THOMAS K. SHERWOOD '24, on "Mass Transfer and Friction in Turbulent Flow"; and LESLIE E. SIMON '29, on "Contribution of Statistics to the Development and Use of Purchasing Specifications and Standards of Quality."

¶ By BRADLEY STOUGHTON '96, in a talk at the annual breakfast of the industrial gas section of the Industrial Gas Association during the National Metal Congress, Cleveland, Ohio, October 22.

¶ By LAURENCE A. HAWKINS '99, on "Research in Peace and in War," at the Portland, Ore., section of the American Institute of Electrical Engineers, October 14.

¶ By CHAPLIN TYLER '16, on investment problems of life insurance companies, before the financial section of the American Life convention, Chicago, October 9.

¶ By JOHN A. HERLIHY '27, on air transportation, at the Harvard School of Business Administration, November 4.

¶ By EDWARD D. STONE '27, judge of the two home-furnishing design competitions of the Museum of Modern Art, New York, N.Y. Also a judge is ALVAR AALTO, staff, at present absent from the Institute, having been recalled to Finland to engage in architectural research in the problems of shelter in connection with the Finnish Government's programs for housing that section of the population affected by the emergency resulting from the war.

¶ By RICHARD T. BARNES, JR., '30, on galvanic corrosion at the Sacramento section of the American Chemical Society, October 15.

¶ By LESLIE S. FLETCHER '33, originator of a project of a short evening course in metallurgical inspection for government inspectors and allied classifications, featuring as instructors prominent members of the Philadelphia chapter of the American Society for Metals, held at Temple University in September. The nine lectures, compressed into three weeks, drew an enrollment of over 800.

DEATHS

** Mentioned in class notes.*

¶ SILAS R. BURNS '80, August 10. A graduate of a special course in architecture, Mr. Burns had been a fellow of the American Institute of Architects since 1886. He had been an invalid for two years before his death.

¶ LUCY J. PIKE '86, March 21.
¶ WILLIAM B. DOUGLAS '87, September 20.
¶ LEANDRO T. SAFFORD '87, September 29.
¶ HORACE B. SPERRY '88, August 19.*
¶ ERNEST V. WRIGHT '89, October 7, 1939.
¶ LAURANCE J. CARMALT '90, June 24.*
¶ FRANCIS W. DUNBAR '90, December 30, 1939.
¶ EDWIN F. DWELLEY '90, September 17.*
¶ HENRY H. POPE '90, April 19.*
¶ ALBERT L. CLOUGH '91, September 21.
¶ CHARLES H. BIGELOW '92, June 10, 1939.*
¶ JOHN J. FALVEY '92, October 8.*
¶ FRANK B. HOLMES '93, August 30.
¶ CHARLES ROYCE BOSS '94, September 1.*
¶ ARTHUR T. BOUTWELL '94, September 2.*
¶ CHESTER W. DENNIS '94, October 9, 1939.*
¶ FRANK F. MAXWELL '94, August.*
¶ THOMAS B. BOOTH '95, October 13.*
¶ JOHN D. J. MOORE '95, October 1.*
¶ WALTER C. POWERS '95, September 7.*
¶ FRANK G. FEELEY '97, October 20.
¶ GEORGE O. HASKELL '98, July 11.
¶ JOHN F. KELLY '98, October 22.
¶ WILLARD A. PRICE '99, June 25.
¶ MATTHEW C. BRUSH '01, October 15.*
¶ WALTER P. DAVIS '01, September 15.*
¶ ALFRED C. JENNINGS '01, June 15, 1927.*
¶ ARTHUR E. NASH '02, October 29.
¶ DAVID P. THOMPSON '02, November 13, 1939.
¶ HOWARD M. BROWN '04, July 26.*
¶ SUMNER E. BROWN '04, May 19.*
¶ HENRY P. DRAKE '04, April 19.*
¶ WALTER J. GILL '04, April 3.*
¶ WALTER H. TRASK, JR., '06, September 1.*
¶ JOHN C. WILSON '06, September 14, 1939.
¶ WALDO P. DRULEY '08, July 1.
¶ EUGENE C. HOWE '08, August 22.*
¶ JOHN R. CARSON '09, October 31.
¶ GEORGE H. COLBURN '10, February 23, 1939.
¶ GAILLARD REMBERT '13, June 30.
¶ JACKSON B. WELLS JR., '16, April 19.
¶ FRANCIS J. MACMANUS '20, April 12, 1939.
¶ CHARLES A. CASSELL '21, July 6.*
¶ WILLIAM A. SNOW '21, September 25.
¶ FRANK A. SOY '26, October 6.
¶ JOHN B. WHEELWRIGHT '30, September 15.

COMPARATIVE SCHOLASTIC STANDINGS OF UNDERGRADUATE ACTIVITY, DORMITORY AND FRATERNITY GROUPS

(Based on June, 1940, Ratings)

	Average	*Increase over June, 1939*	*Corresponding Rank in June, 1939*
1. Officers of the M.I.T.A.A.	4.30	0.73	6
2. Tau Beta Pi	4.24	0.20	1
3. Chi Epsilon	3.95	0.03	2
4. Officers and Representatives Combined Professional Societies	3.75	0.22	7
5. The Tech Management	3.70	0.06	4
6. Alpha Chi Sigma	3.69	0.304	16
Average of 266 men engaged in Athletic Activities	3.67	0.323	
7. T.E.N. Management	3.64	0.12	8
8. Wearers of the "T"	3.62	0.259	20
9. Alpha Tau Omega	3.60	0.24	21
10. Institute Committee	3.592	*0.035	5
11. M.I.T. Student House	3.59	0.12	10
Average of 162 men holding Managerial Positions	3.589	0.999	
Average of 670 men in 20 Activity Groups	3.585	0.165	
12. Varsity Sports Captains	3.57	0.174	15
13. Sigma Alpha Mu	3.53	0.21	23
14. Dormitory Committee	3.52	0.02	9
15. T.C.A. Cabinet	3.47	0.104	19
16. Lambda Chi Alpha	3.453	0.328	36
17. Wearers of Institute Insignia	3.45	0.11	22
18. Phi Gamma Delta	3.445	0.041	13
Sigma Nu	3.445	0.275	32
19. Phi Delta Theta	3.444	0.234	30
20. Phi Sigma Kappa	3.43	0.17	26
21. T.E.N. Staff	3.427	0.051	18
22. Phi Beta Epsilon	3.404	*0.028	11
23. Varsity Sports Managers	3.40	0.11	24
Average of 229 men in Publication Activities	3.396	0.086	
24. Sigma Chi	3.38	0.20	31
Average of 624 Dormitory Residents	3.37	0.02	
25. Phi Beta Delta	3.36	*0.14	9
26. Theta Delta Chi	3.35	0.20	33
27. Theta Chi	3.341	0.355	43
Average of 170 men on Staffs of Activities but not holding Managerial or Executive Positions	3.34	0.106	
28. Voo Doo Staff	3.33	0.223	39
29. The Tech Staff	3.313	*0.072	17
General Average of All Undergraduates	3.31	0.01	
30. Delta Upsilon	3.301	0.071	27
Average of 693 members of 23 Social Fraternities (Does not include: Tau Beta Pi, Alpha Chi Sigma, Chi Epsilon)	3.30	0.07	
31. Technique Management	3.296	*0.614	3
32. Technique Staff	3.29	0.145	34
33. Kappa Sigma	3.25	*0.18	12
34. Phi Kappa Sigma	3.21	*0.01	29
35. Theta Xi	3.209	0.082	35
36. Voo Doo Management	3.178	*0.092	25
37. Delta Kappa Epsilon	3.177	0.189	42
38. Beta Theta Pi	3.176	0.053	37
39. Delta Tau Delta	3.15	0.04	38
40. Sigma Alpha Epsilon	3.13	0.03	40
41. Delta Psi	3.11	*0.29	14
42. Phi Mu Delta	2.98	*0.01	41
43. Chi Phi	2.96	*0.26	28

* Decrease

NEWS FROM THE CLUBS AND CLASSES

CLUB NOTES

National Metal Congress

Co-operating societies at the Congress in Cleveland, October 2 through 25, included the American Society for Metals; Iron and Steel division and Institute of Metals division of the American Institute of Mining and Metallurgical Engineers; the American Welding Society; and the Wire Association. Taking active part in the American Society for Metals conference were: Marcus A. Grossmann '11, who, with R. L. Stephenson, spoke on "The Effect of Grain Size on Hardenability," and with M. Asimow, on "Hardening Characteristics of Various Shapes"; Richard R. Hartwell '30, who spoke on "Corrosion Resistance of Tin Plate; Influence of Steel Base Composition on Service Life of Tin Plate Containers"; and John L. Bray '12 and F. Rolf Morral '32, on "Zinc Coatings: Unit Operations, Costs and Properties."

At the American Institute of Mining and Metallurgical Engineers conference, F. Rolf Morral '32, with E. P. Miller, spoke on "X-Ray Analysis of Hot-Galvanized Heat Treated Coatings"; John Wulff, staff, spoke on "Surface Finish and Structure"; and Morris Cohen '33 and William P. Kimball '31 presented a paper "On the Solidification of Solid Solutions under Equilibrium Conditions."

The American Welding Society conference presented the opportunity of hearing David Arnott '31 speak on "Welding in Shipbuilding"; Robert H. Aborn '20, on "Metallurgical Changes at Welded Joints, and the Weldability of Steels"; Roger B. White '34, with J. T. Lewis, Jr., on "Operation Problems in the Small Welding Shop"; Walter G. Sylvester '36, with G. L. Walker, on "Flame Machining — Control and Applications"; Charles M. Antoni '37, with Cyril Jensen, on "Welded Girders with Inclined Stiffeners"; and George S. Mikhalapov '26 with Cornelius N. Weygandt '33, speak on "Scope and Limitations of the Stored Energy Type Resistance Welding."

On Wednesday, October 23, at the M.I.T. luncheon in the Lattice Room of the Hotel Statler, the following were present: Harry B. Pulsifer '03, Elliot Q. Adams '09, Louis E. Wright '13, Theodore D. Parsons '16, John T. Norton '18, William H. Bassett, Jr., '19, Victor O. Homerberg '21, Willard G. Loesch '21, G. Howard LeFevre '21, Thomas N. Berlage '22, William T. Dunlap, Jr., '22, Harry E. Rockfeller '22, Walter M. Saunders, Jr., '22, George P. Schumacker '22, Van Dorn C. Smith '22, John J. Murphy '23, Roscoe H. Smith '23, Charles W. Springer '23, John W. W. Sullivan '23, Vincent E. Lysaght '24, Mrs. E. P. C. Meyer '25, Frances H. Clark '26, William C. Sessions '26, Frank W. Schreiner '26, Alonzo L. Spencer '26, Elton E. Staples '26, Evan F. Wilson '26, Frank S. Badger, Jr., '27, Howard P. Ferguson '27, Frank C. Hutchison '27, Henry G. Steinbrenner '27, George R. Long '29, Allen G. Shepherd, Jr., '30, Fred L. Coonan '31, Howard B. Huntress '31, Ernest H. Lyons, Jr., '31, Daniel P. Dyer, Jr., '32, F. Rolf Morral '32, Morris Cohen '33, Robert A. A. Hentschel '33, John D. Tyson '33, Gerhard Ansel '34, Gorham K. Crosby '34, Alexander A. Rostartchuk '34, Luis T. Sanchez '34, Carl F. Floe '35, Robert F. Flood '35, Blake M. Loring '37, Herbert A. Zimmerman '37, Gurdon M. Butler, Jr., '38, James B. Hess '38, Robert B. Gordon '39, Peter E. Kyle '39, Morris E. Nicholson '39, George R. Weinbrenner '40, James H. Ferguson '41, Edgar E. Hayes '41, Arthur Solomon '41, and George B. Waterhouse, staff.

Technology Club of Chicago

The fall season for club luncheons opened on October 10 at the University Club. The speaker was Fred Preston, Vice-President of Poor and Company, important manufacturers of railway equipment supplies. Mr. Preston is a director of the Illinois Bell Telephone Company, and civilian chief of ordnance for the Chicago district. Eighty-four attended the luncheon. NELSON C. WORKS '17, *Secretary*, Paine Webber and Company, 209 South La Salle Street, Chicago, Ill. ANDREW P. REBORI '39, *Review Secretary*, 1328 North State Street, Chicago, Ill.

Technology Club of Cincinnati

The Club held its fall meeting on Friday, October 11, at the University Club. Dinner was served at 6:30 P.M. to forty Alumni. Charles G. Merrell '88, Honorary Secretary in the Cincinnati area, presided and introduced the speaker of the evening, B. Alden Thresher '20, Director of Admissions at M.I.T. Professor Thresher gave an account of the staff members now acting as consultants and directors in national defense work, and of the special fields of defense research now being covered at the Institute. He stated that more confidential work for defense preparedness was being conducted at M.I.T. than at any other school in the country. He discussed the possible effect of the draft on the staff and student body, and concluded with an account of the careful selection of candidates for admission to M.I.T. Approximately 600 freshmen a year are admitted.

Part of the business of the evening was the election of officers for the 1940–1941 period, with the result that William V. Schmiedeke '12 is President, John S. Raffety '22, Vice-President, John C. Todd '23, Secretary, and Oliver L. Bardes '21, Treasurer. — There are now 220 Tech men in the Cincinnati metropolitan area. A group of them meet every Tuesday at luncheon in the main dining room of the Hotel Metropole.

Those present at the October 11 evening meeting were: C. G. Merrell '88, M. Carlisle '90, C. H. Urban '91, M. Sax '96, A. H. Pugh '97, R. Tietig '98, W. L. Rapp '00, C. E. Patch '02, F. W. Garber '03, H. D. Loring '07, S. R. Miller '07, F. W. Morrill '07, H. B. Luther '08, C. H. Spiehler '08, E. H. Kruckemeyer '11, J. M. Hargrave '12, W. V. Schmiedeke '12, S. H. Champlin '13, H. M. Campbell '14, R. D. Salisbury '14, A. H. Kinghorn, Jr., '20, B. A. Thresher '20, M. M. Whitaker '20, O. L. Bardes '21, R. C. Dolle '21, M. A. Youtz '21, J. S. Raffety '22, F. W. Spalding '22, J. D. Cochrane '23, S. R. Weibel '28, L. H. Mollenkoph '29, R. Tietig, Jr., '32, S. I. Crew '34, B. S. Frieberg '35, J. M. Freiberg '37, J. Sullivan, Jr., '38, P. Berchtold '39, J. P. Renshaw '39, R. V. Sternberg '39, W. G. Thomas '39, and W. C. Francis '40. — JOHN C. TODD '23, *Secretary*, 240 Elm Avenue, Wyoming, Ohio.

Detroit Technology Association

The October dinner meeting of the Association was held at 7:00 P.M. on Thursday, the thirty-first, at the Intercollegiate Alumni Club. Louis J. Rosenberg, former United States consul to Spain and to Brazil, and now honorary consul of Panama in Detroit, spoke on "Pan-Americanism."

On November 26, Detroit Alumni were guests of the Chrysler Corporation at their new engineering laboratories. — JOHN E. LONGYEAR '26, *President*, The Detroit Edison Company, 2000 Second Avenue, Detroit, Mich.

Technology Club of Central Pennsylvania

On October 9 the Club held its first meeting of the season. We were extremely fortunate in having B. Alden Thresher '20, Director of Admissions at M.I.T., as our guest. His talk was very enjoyable, and we all welcomed the opportunity to learn what is going on at the Institute. — With minor deviations the Club voted to accept the constitution which has been recommended by the Alumni Association.

The following Alumni and guests were present: E. A. Weimer '98, H. W. Goldthwaite '99, F. A. Robbins, Jr., '02, P. E. Tillson '06, C. J. Walton '14, G. C. Wilson '15, B. A. Thresher '20, B. J. Stevens '23, F. A. J. Brown '26, A. R. Brugnoni '26, J. V. Masterman '26, J. P. Connelly '28, H. R. Spaans '30, J. H. Toas '30, W. H. Van Buren '32, E. T. P. Neubauer '33, R. D. Morton '37, John Guttel '38, P. P.

Chunko '39, D. J. Parr, Jr., '45, Henry Tillson '45, F. C. Baldwin, headmaster of Harrisburg Academy, W. H. Gould, J. T. Hummer, and D. J. Parr. — HAROLD R. SPAANS '30, *Secretary*, 1819 Elm Street, New Cumberland, Pa.

Technology Club of New Hampshire

The 1940 annual meeting was held on October 10 at the Carpenter Hotel in Manchester, with Arthur J. Conner '88 presiding. Once again Charlie Locke '96 provided excellent speakers for the meeting. After a few words from Professor Locke, Henry B. Kane '24, Director of the Alumni Fund, told of the new system for contributions to the fund, and explained several details concerning it which have been bothering Alumni. James R. Killian, Jr., '26, executive secretary to President Compton, explained the many duties of Dr. Compton, who spends three or four days a week in Washington on the new defense program as a member of the National Defense Research Committee, besides carrying on his work at Technology.

The main speaker was Horace S. Ford, Treasurer of the Institute, who brought slides with him to illustrate his talk on finances at M.I.T. He had graphs showing the sources of income and expenditures at Technology for the past fifteen years. He explained that Tech is operating within its budget and has not drawn on any reserve funds for several years. He spoke of the endowment funds, investments, and retirement fund for professors. He had slides showing the apartment hotel bought for graduate students, the new dining room, swimming pool, and building for naval architecture. Treasurer Ford showed pictures of the new Wright Brothers Memorial Wind Tunnel for testing airplanes in wind velocities up to 400 miles an hour, and told how it is being used by the large airplane companies. Views of the atom-smashing machines were also interesting.

The following officers were elected: Malcolm C. Mackenzie '14, President, and Representative to the Alumni Council; Samuel P. Hunt '95, Vice-President; Victor S. Phaneuf '21, Vice-President; Richard S. Holmgren '19, Vice-President; and Horace A. Emerson '27, Secretary and Treasurer. — Those present were: A. J. Conner '88, N. S. Bean '94, S. P. Hunt '95, J. R. Daniell '97, F. E. Everett '00, L. A. Thompson '05, W. G. Abbott '06, W. D. Davol '06, C. A. Hall '08, E. W. Bowler '14, L. S. Hall '14, M. C. Mackenzie '14, W. M. Africa '15, H. D. Swift '15, G. W. Waymouth '16, P. F. Maher '17, R. S. Holmgren '18, H. E. Langley '19, A. H. Castor '20, R. W. Haskel '21, V. S. Phaneuf '21, A. R. Holden '23, C. P. Boyd '25, E. S. Pratt '26, E. G. Cowen '27, H. A. Emerson '27, G. E. Murray '32, E. R. Atkinson '33, E. F. Magenau '34, R. E. LeBlanc '36, A. J. Meloon '39, Budd Robb '40, and D. C. Pridham. — HORACE A. EMERSON '27, *Secretary*, 196 South Street, Concord, N.H.

M.I.T. Club of Western Pennsylvania

The Edgewood Country Club in Wilkinsburg was the scene of the September meeting of the Club. Advance publicity extended an invitation to come out and meet the gang and have some fun at the first meeting of the season. The program listed various golf matches for the late afternoon with provisions for an early start at the beer barrel for those who did not arrive in time to play golf.

Elbridge J. Casselman '15, President for the 1940–1941 season, welcomed everyone and struck the keynote for a general bull session. At 7:30 a special buffet type dinner gave everyone a chance to eat all he wanted of a large variety of choice foods. After dinner a number of card games were played, and the beer continued to flow. Old acquaintances were renewed and new members were welcomed into the fold. — F. REED DALLYE '22, *Secretary*, Aluminum Company of America, 801 Gulf Building, Pittsburgh, Pa. PAUL R. DES JARDINS '38, *Assistant Secretary*, 1945 Koppers Building, Pittsburgh, Pa.

Technology Club of the Connecticut Valley

The Club had its first meeting of the year on October 23, when President Compton journeyed from Cambridge to tell us about M.I.T. and national defense. Among those seated at the head table with Dr. Compton were Charles E. Locke '96, Alumni Secretary; Leonard J. Brooks '23, President of the Valley Club; Henry Giles '29, President of the Hartford Club; A. S. LaPenta '22, Secretary of the Hartford Club; and Roger L. Putnam '17, Mayor of Springfield. The speakers were greeted with an M.I.T. yell from the 100 members present, led by G. Dudley Mylchreest '36 of Hartford.

After exchanging pleasantries with Mayor Putnam, Dr. Compton told us about the efforts being made at M.I.T. to speed national defense, both by training men in special courses and by undertaking research projects for the government and private industry. Afterwards President Compton was surrounded by Alumni renewing acquaintance with him. — The meeting received extensive notice in the Springfield papers. The Springfield *Union* reported: "The Army estimates it will need 15,000 inspectors of manufactured materials within the next year and doesn't know where to get them; three aircraft plants estimate they can use 375 junior aeronautical engineers; the U.S. Army Air Corps is demanding scores of trained meteorologists. . . .

"Speaking on the place of M.I.T. in the national defense program, President Compton outlined the emergency training courses now under way, research and development projects undertaken by the institution and the emergency positions being filled by staff members. Four members of the faculty have been given leaves of absence to do work relative to protecting ships against magnetic mines; a former dean is developing cultural relations with South America; a dozen faculty members are with the National Defense Research Committee. Others have equally important positions.

"Of the 50 government contracts for research work now being carried out in M.I.T. laboratories, two thirds pertain to national defense, the president said. Forty Air Corps men were trained this summer in a system of weather forecasting developed by M.I.T. and 50 others are now being trained. These will be instructors for other classes in weather forecasting as the Army plans to train several thousand forecasters. As a member of the National Defense Research Committee in which his special fields are radio, instruments and fire control, Dr. Compton related some of the problems of the committee. Every consultant named by the committee must be investigated by the Army or Navy intelligence sections and the FBI.

"There is so much government red tape in securing small funds rapidly that it is faster and less nerve wracking to spend your own money, Dr. Compton said, citing a small purchase of paper staples. In co-operating with the Government in its defense program M.I.T. is attempting to carry on its regular program while losing regular staff members for defense projects. Replacements have been found and the extra load shared. Limitation of space is another problem and a recent survey has been completed showing what space may not be rented. M.I.T. will be unable to take on additional emergency work at the end of two months and maintain its regular program at the same time, President Compton said." — JOHN G. WHEALE '38, *Secretary*, 95 State Street, Springfield, Mass.

Technology Club of Central Florida

James J. R. Bristow '14, of Safety Harbor, Fla., entertained the Club at a barbecue on the evening of October 22. The meeting was attended by Harvey S. Chase '83, Harvey M. Mansfield '83, Albert N. Morton '04, Franklin O. Adams '07, James J. R. Bristow '14, Fred D. Mendenhall '14, Laurence P. Geer '15, Max J. Mackler '17, Willard B. Newell '17, Malcolm R. McKinley '19, William W. Upham '23, J. Allen Weaver '23, Richard D. Jackson '24, and Edward W. May '34. B. C. Skinner of Dunedin and E. S. Geiger of Tampa were guests of members.

Following the dinner and a brief business session to make plans for a December 16 meeting with Horace S. Ford, Treasurer of the Institute, we had a very interesting lecture and demonstration on the chemistry of fluorescent lighting by Thomas F. Hurst of St. Petersburg. — MALCOLM R. MCKINLEY '19, *Secretary*, Tampa Electric Company, Tampa, Fla.

M.I.T. Club of Toledo

On September 19, Alumni met at the Women's Club for a dinner meeting and talk by Robert G. Caldwell, Dean of

Humanities at M.I.T. For most of us this was the first opportunity to meet Dean Caldwell, and we have had few speakers who so enchanted and interested their audience. We only regret there were not more to hear him speak. Not only did we get a clearer understanding of the Division of Humanities at M.I.T., but there was unanimous enthusiasm for the man himself. We congratulate M.I.T. on the addition of Dean Caldwell to its staff. Those present at the meeting were: B. E. Hopkins '20, J. R. Mahan '20, H. F. Stose '21, H. A. Barnby '23, E. C. Ewald '26, C. P. Whittier '27, A. R. Smith, Jr., '28, Henry Grinsfelder '31, W. J. Bates '35, T. L. Hallenbeck '37, and W. E. Eaton, Jr., '38. — CHARLTON P. WHITTIER '27, *Secretary*, Owens-Illinois Glass Company, Toledo, Ohio.

CLASS NOTES

1888

Alexander F. MacDonald finished a special course with us, and in October, 1889, was employed in the patent department of the Thomson-Houston Company in Lynn. The patent work was centralized at the General Electric Company in Schenectady in 1894, and MacDonald is now entering his fifty-second year of service there as assistant patent attorney. In addition to his service record he probably also holds a record for the number of lines of apparatus with which he has dealt. In the early days of his activities he worked with inventions relating to arc lamps, coin-controlled apparatus, controllers, switches, transformers, railway motors, and line material. When the General Electric Company acquired the Curtis steam turbine patents and started turbine development, he became responsible for this very active line of work. As a result, he is today one of the best-informed men in the country on the patent situation in the steam turbine field. In addition he has found time to deal with gas, oil, and steam engines, air compressors, vacuum cleaners, electric drive for automobiles, and electric cable. Just at present oil-filled cable is occupying a large part of his time, and he has become an authority on this subject. For many years he resided on Washington Avenue, Schenectady, in a home which was made famous by the fact that Washington spent a night there.

The San Francisco, Calif., *Wall Street Journal* printed the following: "Horace B. Sperry, president of North American Oil Cons. for the past seven years, died August 19th after an illness of several months. Mr. Sperry was . . . a member of the Bohemian Club of San Francisco, and Occidental Lodge of the Masonic organization. Mr. Sperry is survived by a widow, Mabel Bunker Sperry, a sister, Mrs. B. A. Bodwell of Petaluma, and a brother, Austin Sperry of Berkeley, Cal." — Lonsdale Green '87 of Chicago, a close friend of Louie Ferguson, whose death we reported in the November Review, said that Louie was vacationing at his summer home near Eagle River, Wis., when he became ill. — Fred Nichols is located for the winter at 107 East Robinson Avenue, Orlando, Fla. His hobby is contract, and he works at it every day except when taking Mrs. Nichols motoring.

Ben Buttolph has sent us the following extract from a letter, dated December 12, 1886, he had written to his mother: "A party of our Class took advantage of the sleighing and bright moon to have a sleigh ride to Lexington on Friday eve. We numbered twenty-four and had a six-horse team; the sleigh was gondola style. The evening was mild and the moon was full. We had oyster stew and coffee at the Massachusetts House. It was an eleven mile ride. We went out by Cottage Farm and Cambridge. We had a dozen tin horns. At the hotel we united in a prolonged cheer. A party from Chelsea was there, some of whom knew our fellows, and they all had a dance. Then the boys gathered around the piano and the musical members sang. We wound up with a Virginia reel. P.S. I do not recall his name, but one of the boys got some of the stew down the back of his neck by an accident of the waitress."

Your Secretary and Mrs. Collins came from Chebeague Island directly to the university town of Princeton, N.J., on October 15 to spend the winter with their eldest daughter, Dorothea, who is curator of the Pliny-Fisk Library of Railroad and Corporation Finance at Princeton. We expect to stay here till we return to Caso Bay about May 1. — BERTRAND R. T. COLLINS, *Secretary*, 57 Wiggins Street, Princeton, N.J.

1890

Our fiftieth anniversary was quietly celebrated at Marblehead on Saturday and Sunday, June 1 and 2. Twenty-six members of the Class gathered: Atwood, Bartlett, Batchelder, Miss Bragg, Brownell, Burley, Carlton, Carney, Chase, Clement, Crane, Fenn, Flint, Goodwin, Greenlaw, Horton, Knight, Noyes, Packard, Roots, Sherman, Tilson, Waite, Walker, White, and Whitney. We also had the pleasure of the presence of Mrs. Gilmore, and the wives of Atwood, Carlton, Chase, Clement, Goodwin, Greenlaw, Horton, Packard, and White. With perfect weather and such attractive surroundings few seemed desirous of going farther afield than the quaint old section of the town, but there was plenty of interest in the tales of those present, and the replies to the questions about what the absent ones had been doing.

After luncheon Saturday all of us lined up for a group photograph. In the evening there was a brief business meeting following a tribute to the thirty-six members who have passed on since our forty-fifth. At this meeting it was voted: "That the officers of the Class of 1890, M.I.T., shall continue to be a Secretary and an Assistant Secretary, and that in the event that the incumbent of either of these offices shall cease to be able to act, the other officer, as Secretary, shall appoint an Assistant Secretary. That any unused balance remaining in the Class of '90 fund, when the organization shall cease to act, shall be turned over to the Alumni Fund of the Massachusetts Institute of Technology." — The fund referred to is what is left of the money collected from the Class many years ago to pay expenses of notices and the like. As '90 has never published a book of biographical notes of its members, the expense has been comparatively small, and something over two hundred dollars remains which may or may not be exhausted, depending on future conditions. — This meeting was followed by the projection of many of our '90 graduation photographs, with a guessing contest as to who they were, in which Greenlaw showed great proficiency.

Sunday morning a few drove to Marblehead Neck, to Salem to see the House of Seven Gables, and to other points of interest. Following dinner each one gave a brief account of such of his past activities as he saw fit. Later Mrs. White entertained the ladies at tea at the Eastern Yacht Club, and at 5:00 P.M. we separated, to meet again at Cambridge on Alumni Day, June 3. Here we were joined by du Pont, Lenfest, Roberts, Ropes, Sophia Hayden Bennett, and Miss Rogers, and also the wives of John Batchelder, Burley, Knight, Roots, and three of the daughters, so that the luncheon on the lawn, with President and Mrs. Compton, was enjoyed by fifty. Again, with perfect weather, we grouped for a photograph in order to include those who were not at Marblehead.

At the Class Day exercises in Lowell Court the first speaker to be introduced was Pierre du Pont, representing the fifty-year class. After reminiscing on extracurricular activities in our student days, he closed with the sound counsel and cogent suggestions to the graduating class which appeared in the July Review (p. 382). The advice is excellent even for those who have been graduated for many years. In his "Adventures of a White Collar Man" in the *Saturday Evening Post*, Alfred Sloan '95 relates his experience in inducing Pierre du Pont to become president of General Motors. He says: "We all recognized his great ability, his courage, and the confidence that he could reestablish in the corporation and throughout its organization."

About everyone turned up (including Curtis whom we had not seen before), as guests of du Pont at the cocktail hour, which was celebrated at '90 headquarters in the Statler Hotel. From there we proceeded to the Alumni banquet. — At Commencement on the following day twenty-four, including Adelaide Sherman Blackmer, appeared to don cap and gown in the academic procession, and to listen to the stirring address by Henning Prentis, Jr. Goodwin, as Dean of the Graduate School, announced the recipients of doctor's and master's degrees as President Compton presented their diplomas.

When Dr. Seaver, for the Technology library, asked for a copy of any book issued by the Class, the Secretary, in his ignorance, wrote that there had been none.

1890 Continued

Now Charles Sherman has proved the incorrectness of this statement by bringing in two copies of the *1890 Class Day Souvenir*, which contains the baccalaureate sermon by Phillips Brooks, and the Class Day exercises, including the greeting by Gary Calkins, oration by Ripley, poem by Greenlaw, statistics by Flood, class history by Batchelder, prophecies by Loring, and President Walker's address. One of these has been placed in the '90 files, and the other has been passed on to the Institute library, and we hereby extend our thanks to Sherman. Sherman has also secured for the class files a copy of the memoir of the American Society of Civil Engineers on Guy Emerson. It is especially notable that this refers to his engineering mind as "distinctly of the constructive and creative type rather than of a theoretical character: that is to say, he was inclined to interest himself in the creative aspects of engineering rather than in analytical and research investigations, and it was in this field that he met his greatest degree of success."

Laurance Johnson Carmalt died in New Haven on June 24. The following is quoted from the notice to his classmates of Yale '88: "He attended the Massachusetts Institute of Technology from 1888 to 1890, was afterwards connected with a number of railroad companies, including the Norfolk & Western Railroad, the Southern Railroad, the New York Central & Hudson River Railroad, the Long Island Railroad, and the New Haven Road. He had also been connected with the U. S. Engineer Corps and the Baldwin Engineering Company of New York. From 1923 until his retirement in 1938 he had been engaged as a consulting civil engineer in New Haven. At one time Carmalt served as president of the Connecticut Section of the American Society of Civil Engineers, and he had been a director of the Sleeping Giant Park Association and an officer of the Hamden (Conn.) Chamber of Commerce. He was the author of a 'Guide Book of New Haven and Yale University', published in 1933." In a letter to the Secretary in 1937, he wrote that although practically retired he kept "active in civic work, being chairman of a civic development committee in the town of Hamden and chairman of the reservations committee of the Connecticut Forest and Park Association." He was quite amused when, after acting as supervising and planning engineer with the Federal Emergency Relief Administration, his appointment to a similar position with the W.P.A. was turned down by the state administrator on the ground that he was "not qualified."

Edwin F. Dwelley died on September 17 in Hanover, where he had lived since he retired about six years ago. He was in private engineering practice in Lynn for many years, and the Secretary hopes to obtain some additional information about his work for a later issue of The Review. — Mrs. Henry Pope, in acknowledging a letter of sympathy from the Class, sends this additional information about her husband: "Very soon after leaving Tech he came to Appleton, Wis., to a chemical sulphite mill, the first of its kind in the country. He had married into an Appleton paper mill family, manufacturers of paper and pulp, in 1898. After four years he was transferred to a mill owned by the same company in Madison, Maine. This became the Great Northern Paper Company, which later built a large mill in Millinocket, Maine. By this time there was no connection with the Wisconsin Mill, which has long since been owned by a western paper company. The only connection with the chemical end occurred during his sojourn in Appleton. Our home was for seven years each in Madison, Bangor, and Millinocket, all in Maine, and the work, for the same company. Whether he served as assistant to the manager or was buying for their great wood's operation, or what not, his title was 'agent.' As his health was poor, he resigned in the fall of 1918, and did not take up active work again. We finally settled in Oak Park, after a lengthy sojourn in California and much travel, and have lived in the same house for more than twenty-one years. He was interested in many things and enjoyed life and got a great deal out of it. He was a member of the First Congregational Church here, having served it in many ways."

The 1940 catalogue of M.I.T. lists Harry Goodwin as "Honorary Dean of the Graduate School." He continues to give a couple of courses. — The address of Burdett Moody has been changed to 1200 South Arlington Avenue, Los Angeles, Calif. — The address of Miss Mary L. W. Morse is now at the Latrobe Apartments, Charles and Reed Streets, Baltimore, Md.

Margaret E. Maltby, one of '90's three original members of Course VIII, was recently in Boston visiting the Goodwins and seeing old friends. The first woman to take a Ph.D. degree in physics in Germany, Dr. Maltby held the position as head of the department of physics at Barnard College until her retirement a few years ago. She now makes her home in San Francisco at 2449 Pacific Avenue. Margaret is as much a live wire as ever. Since becoming a professor emeritus she has spent much time in travel, having taken a trip around the world and to Mexico, Guatemala, Finland, Lapland, Scandinavia, and last year down the Yukon to McKinley Park in Alaska. — GEORGE A. PACKARD, *Secretary*, 50 Congress Street, Boston, Mass. HARRY M. GOODWIN, *Assistant Secretary*, Room 4-136, M.I.T., Cambridge, Mass.

1892

The meeting of the Class was held as planned on June 1 at the Boston City Club. Thirteen answered the roll call and proceeded to supper. They were Carlson, C. H. Chase, Dean, Fuller, J. W. Hall, Hutchinson, Locke, Maynard, Norcross, Ober, Richardson, Sargent, and Slade. After a poetic toast by Slade the Secretary read his report, which showed that we have 157 still on the mailing list. Fifty-five addresses are lacking. Can anyone furnish that of John D. Hilliard, William R. Kendall or George F. Eldridge? There are in the list of deceased members in the last alumni "Register" 100 names of '92, of whom twenty have been added since our forty-fifth reunion. As Treasurer he reported that the class fund was still intact and sufficient to last out our time.

A number of the Class sent word of their doings. First came news from Billy Kales that he was still on the mend. The Secretary was ordered by a rising vote to send him a message of good luck and cheer. On June 14 he replied to this message, saying in part: "The information you give me with regard to the Class is very interesting. I cannot say that it gives me a great deal of pleasure, because you tell me of too many of my dear old friends whom I shall never see again. Mrs. Kales and I arrived in Detroit . . . after almost seven weeks in Tryon, N.C. I am feeling very much better than when I went south, and we should have stayed longer had it not been for the hot weather." — R. D. Chase wrote: "Your circular in regard to a get-together before the circus of June 3 sounds good to me, but about that time things will be rather hectic because then the Chase family moves from New Bedford to a little island off the coast." — Carleton E. Davis said: "Each year I am almost persuaded to attend Alumni Day. This year I am going further than usual, and am writing you to say that I am tempted, but find it impossible to leave."

Sumner Ely found that time of the year unfavorable for getting away. — Forbush said he would be down south somewhere; he didn't say where. — Mrs. Holman wrote: "Of course I should like to come to a quiet gathering of the remnants of '92, but I fear that I should be the only representative of my sex present. The figures at the foot of that circular make me think furiously that I shall be seventy-two on my next birthday." She sent greetings to all the Class. — Fairfield was opening his house in Maine on June 28 and planned to take a long week end. "Otherwise I should be only too glad to add another to the gathering." — Laurence Manley reported himself in good health, though, like many of the rest of us, in a more or less involuntary retirement from business. He has done subway construction since 1896 in Boston and Philadelphia. He lives quietly with a devoted wife, for the present in Philadelphia in the winter, and in a little cottage in Island Heights, N.J., on Barnegat Bay, for a while in the summer. He has a large family, including five grandchildren, who rally round often. — Bill Messenger wrote: "Maybe if the skies are brighter by 1942 I shall make a very special effort to get to our fifty-year reunion. I met Skinner a year ago at the informal meeting we had of the Technology Club of Central Florida at Clearwater, but aside from him, I haven't seen a '92 man in years."

Herbert Moody is ending his second year of retirement, but time does not hang heavily on his hands because he has work on the National Research Council, and other activities. — Scott Parrish said:

1892 Continued

". . . I greatly regret that it was not feasible for me to go to Boston in early June. However, . . . I am delighted that there are still 152 left to carry on. I had a letter from Charles H. Muhlenberg a few days ago and he said he was preparing to go to our fiftieth anniversary meeting in 1942, provided I go. . . ." Frank E. Perkins, deputy superintendent of the board of education, New York City, said: ". . . I think I could attend an M.I.T. reunion in New York. I have not seen the boys for some time; — no lack of interest, just busy with 300 schools to keep going. I was seventy in September, but am still peppy. . . ."

George Rowell would have liked to attend but could not. He said that Manley was the only one he had seen for some time. Both are Philadelphians. — R. R. Taylor from Wilmington, N.C., expressed interest in the plan for the meeting and hoped to come if health permitted.—David Whiting from Wilton, N.H., could not come, but we hope to see him at the next gathering. — Orville Denison '11 sent us a picture of the Wells brothers in a Hawaiian toast. It shows them clinking glasses and is captioned: "In the glasses? It's pineapple juice." — From Gerard Swope '95 to Kales to Hutchinson (sounds like a double play) we learned that the address we had for Paul Carvalho was incorrect. The corrected address is Cia Paulista de Aniagens, Rus São Bento 329, São Paula, Brazil. — Others who sent regrets were D. A. Cater, B. P. Du Bois, E. C. Hall, H. C. Hartshorn, G. H. Ingraham, C. N. Palmer, C. F. Park, D. P. Robinson, W. E. Scales, W. L. Tidd, and C. F. Wallace. — The lunch in Du Pont Court on Alumni Day was attended by Carlson, C. H. Chase, C. E. Fuller, J. W. Hall, Hutchinson, Ingraham, and Park. Park told us that he was sitting for his portrait which is to adorn the walls of the Institute.

A. F. Knudsen wrote from Honolulu on May 26 that he had been traveling in Asia for the last five years and in the last six months had been on the move almost constantly. "Here I am on my way back to the United States, and I hope to be there for both the 1941 and 1942 reunions. In Shanghai, Hong Kong, and in Kunming (Yunnan-Fu), I was in touch with Technology men and found an active Tech club in Shanghai. In Kunming we were not able in my short visit to really form a Tech club. I am no longer in active business but travel a great deal for study in anthropology. My permanent address is 2117 Vista Del Mar Avenue, Los Angeles, Calif."

Your Secretaries have received belated news of the death of Charles H. Bigelow, who died at his home in Plainfield, N.J., on June 10, 1939, at the age of seventy-three. He was born in Salem, Mass., and was educated in the Salem public schools and the School of Mechanic Arts. He spent a year in the machine shop of the Naumkeag Cotton Mills, Salem, and in 1884 entered the employ of the Bell Telephone Company of Montreal. After an accident there which resulted in the loss of one eye, he entered M.I.T. in 1888.

Immediately after graduation he was sent to Rumford Falls, Maine, by Stone and Webster, Inc. to install an electric lighting plant. In 1894 he entered the employ of the Boston Elevated Railway Company as inspector at a powerhouse in South Boston. He remained with the Elevated until 1905, becoming assistant to C. F. Baker, chief mechanical engineer. There he was in charge of construction, and later of maintenance. He then returned to Stone and Webster, who sent him to Texas in charge of the construction of a large powerhouse for the Dallas Electric Light and Power Company.

In 1907 he returned north to enter the employ of the New York Engineering Company, and in October was put in charge of construction of one of the powerhouses for the McAdoo Tunnel in Jersey City. In 1908 C. T. Main, Inc., of Boston employed him for the construction of a dam at West Point, Ga., on the Chattahoochee River. He remained with the C. T. Main organization until 1911, working from the Boston office. In the fall of 1911 he was engaged by the Yale and Towne Company as assistant to the chief mechanical engineer and was sent to St. Catharine, Ontario, to oversee the construction of a factory and powerhouse. In November, 1913, Bigelow accepted the post of chief mechanical engineer with the Millville Manufacturing Company of Millville, N.J., which position he held for ten years. While with them he had charge of building a new powerhouse and bleachery, and of changing to electricity throughout the mills.

In May, 1923, he became plant engineer with the Spicer Manufacturing Company of Plainfield, N.J. There he had charge of construction and maintenance of the powerhouse and factory buildings until 1930, when the Spicer Company moved their plant to Toledo, Ohio. Bigelow, not wishing to leave the East, resigned. A year later he became bridge inspector for the state highways of New Jersey, a post he held for seven years until his resignation in December, 1938. — He was a past commander of the Knight Templars of New Jersey and chaplain of Trinity Commandery at the time of his death.

John J. Falvey died suddenly on October 8 at his home in Somerville. He was born there seventy years ago and had always lived there. W. W. Locke reports meeting Falvey in 1928. At that time he had charge, for the contractor, of laying a pipe line from Ashland reservoir around the second Framingham reservoir to the Sudbury aqueduct. The work was done for the Metropolitan District Water Supply Commission. Falvey told Locke that he had been engaged in civil engineering work in many places throughout the United States ever since leaving Technology at the end of his junior year. For forty years he was a member of the Mount Benedict Council, Knights of Columbus. He is survived by his widow, Elizabeth L., three sons, and two daughters.

The Secretary has received from Joseph P. Lyon what might be called an essay on his own experiences, and also of others, at Technology and afterwards, with reflections on life, engineering, and many other matters. It is written with great care, but unfortunately its length precludes publication as class notes. — JOHN W. HALL, *Secretary*, 8 Hillside Street, Roxbury, Mass. W. SPENCER HUTCHINSON, *Assistant Secretary*, 75 Federal Street, Boston, Mass.

1894

Alumni Day found a few '94 men here for the various events, but the presence of Ray Price and his wife was the thing which gave his classmates the greatest pleasure. Naturally, the events taking place in France, where the Prices made their permanent home, weighed heavily on their minds, but despite this Ray greeted his old friends with his characteristic warmth and sincerity, and those of us who were present will always remember with pleasure his being with us once more. Ray and his wife were planning to leave by clipper for Lisbon shortly after their Boston visit and to go thence to Paris to find out what might have happened to their household, and to do what they could for France. Except for a friendly note of thanks written from Atlantic City, no news has been received from him by the Secretary since those early days of June. Our thoughts must often be of them, and our hopes that misfortune has not laid a heavy hand on such courageous and splendid spirits.

June was a busy month for the Secretary. As soon as the events of the academic year were over he was immersed in the affairs of the new national professional society, the Institute of Food Technologists, which had its birth at M.I.T. in 1939. The first annual convention of the new organization was a most successful meeting in Chicago with an attendance of over six hundred. We had a series of excellent sessions covering the scientific fields of food manufacture and engineering and the new developments in numerous technical aspects of the nutritional, microbiological, and biochemical problems of food supply. The society did a dangerous thing in re-electing your Secretary as president, an honor of which he is naturally very proud. As an antidote for this plunge into official greatness he found it desirable to spend a week in fishing for Atlantic salmon in the wilds of New Brunswick, and was readily convinced that a fish can easily outwit a dean and president. — Another honor, if it can be so called, which has recently come to him is election to the governing council of the American Public Health Association at the Detroit meeting in early October.

Mason Chace is one of our members who avoids giving news of himself. But he has been located again, at present at the San Diego Club, San Diego, Calif. It is time he sent us news of his activities. — Jim Kimberly has sent his address as Tryon, N.C. It looks as if Jim had a three-cornered beat which he patrols, one corner being his old home at Neenah, Wis., one, Tryon, with Washington as the third spot.

1894 Continued

Horatio Parker and the Secretary had several pleasant chats in Detroit. Horatio is in charge of all the laboratory work of the health department of the rapidly growing city of Jacksonville, Fla., a position which he has filled with distinction for several years. A letter from him earlier in the autumn brought the sad news of the death of Frank F. Maxwell of Fernandina, Fla., which occurred in August. Maxwell had been a lifelong resident of Fernandina, where he practiced his profession of civil engineering.

Chester Dennis, who was with the Class during its early years, died on October 9, 1939. No details of his activities for many years are available. — On September 1 occurred the death of Charles R. Boss, after a year's illness, at Wallingford, Conn. Boss was graduated in the old Course IX, and soon after graduation went into the biscuit manufacturing business with his father in New London. Later he was associated with A. B. Leach and Company in the investment business and had been connected with their offices in New York and Boston as well as in his home city of New London. He was an active member of the Freemasons and of the Thames Club of New London. — Arthur T. Boutwell of Andover died on September 2. Boutwell was connected with the Ludlow Manufacturing Associates (Smith and Dove division). He was a graduate of Amherst, and came to Technology for work in chemistry. He was associated with our Class in its fourth year. He will be remembered by the chemists as quiet but most friendly and gentlemanly, a characterization which apparently applied throughout his whole life. He was active in public and philanthropic affairs in Andover. Our sincere sympathy goes to the families and friends of these men whose deaths are here recorded.

Al Tenny is one of those fortunate, or perhaps one should say wise, individuals who takes time off to live. During the early summer he indulged in his favorite sport of fishing in Canada, and then spent the remainder of the summer at his farm in Wolfeboro, N.H., on Lake Wentworth. A telephone call to his office brought the news that he was on a sailing trip to Annapolis to see his grandson who is a cadet at the Naval Academy. — Occasional letters or greeting cards pass between Mrs. de Lancy and the Secretary. She is always doing things of interest and seeing the world. One card mentions a reunion of the '94 coeds in Chicago. Another tells of a motor tour in northern New Hampshire and Vermont, while a third is the bearer of news regarding some new grandchildren.

It took the Secretary three years to discover that his daughter-in-law and the daughter of Sam Reed were warm friends in Seattle — an interesting example of the sometimes remote ways by which old friends hear of each other. Sam was no doubt very busy recently working in Oregon on Mr. Willkie's behalf. — A very pleasant note from Mrs. Austin Sperry told of their enjoyment at being with the other '94 members at our reunion and urged us to visit them and the Treasure Island Fair. Nothing could be more delightful. The Class will always think of Sperry, Jack Nowell, and the other classmates in California as a part of the celebrated scenery and climate of that great and rapidly growing state. The Secretary hopes to be able to visit them after his retirement from active service in 1942. — SAMUEL C. PRESCOTT, *Secretary*, Room 3-207, M.I.T., Cambridge, Mass.

1895

We lost our Class President, Tommy Booth, VI, who died suddenly on October 13 at his residence 133 Gibbs Street, Newton Centre, Mass. Following graduation, from June to October, he worked for the Long Distance Telephone Company, of New York City. From October, 1895, until June, 1899, he served with the motor carriage department of the Pope Manufacturing Company at Hartford, Conn., where he assisted in automobile development, and in design, testing, and experimental research. He went to Washington, D.C., in June, 1899, as assistant examiner in the United States Patent Office for about three years. During his stay in Washington he studied law at Columbus and Georgetown universities, and was admitted to the bar of the District of Columbia in October, 1901.

In 1902 he went to Boston to practice law in the office of Frederick L. Emery and remained there until his death. After Mr. Emery died a few years ago, Tom became the senior member of the firm of Emery, Booth, Townsend, Miller, and Weidener, with offices at 50 Congress Street, Boston. He followed the patent business, mainly, and tried a number of important cases in the courts at Washington. Tom was a member of the American Patent Law Association, Exchange Club, Boston City Club, Woodland Golf Club, Vesper Country Club, and the University clubs of Boston and Washington. He was a Delta Kappa Epsilon Fraternity man. When opportunity permitted he played golf and was always planning an automobile trip, several of which he made in the British Isles.

With all his numerous activities he was first and last a Technology man and a most enthusiastic member of the Class. Both in spirit and action he was never found wanting. He served as Class Treasurer from 1892 to 1893, and was President of our Class from 1919 to October, 1940, with the exception of the years 1922 to 1925. At the time of his death he was Class Agent of the Alumni Fund and was on the Council of the Alumni Association. He never missed a class reunion, and always worked for the interests and comfort of those who were able to attend. His outstanding service to the Class was his leadership and work in compiling, editing, and publishing the twenty-fifth anniversary book in 1920. This alone stands as a fitting memorial to his class spirit. In September, 1901, he married Annie L. Ives, who survives him, as do two sons, a daughter, and some grandchildren. Tommy was a great lad; your Secretary has always found it a real privilege to have been so intimately associated with him in class affairs. His spirit was the best; his counsel and judgment most valuable. He never failed the Class. We shall miss him. George Cutter, Andy Fuller, Ed Tucker, Win Parker, Walter Williams, and Yoder attended the funeral on Tuesday, October 15. Denison '11 and Carlson '92 were with us.

John Denis Joseph Moore, II, died from a heart attack at his home, 178 East 70th Street, New York City, on October 1. He attended the forty-fifth reunion at Swampscott in the best of health, and we enjoyed his ever exuberant spirit and consideration for the welfare of the Class and mankind in general. His passing was a shock to all who knew him and loved him. After leaving Technology, he served as a master mechanic for the Lewiston, Maine, bleachery in 1896–1898, after which he became an engineer for the Westinghouse Electric and Manufacturing Company. Later he worked for the Fore River Shipbuilding Company as an engineer until 1903, when he became a consulting engineer in New York City. He was a member of the New York City Building Code Revision Commission in 1908–1909. By appointment of Governor Dix, he became a state conservation commissioner in 1911. At that time he was employed by District Attorney Whitman as an expert in the investigation of the Triangle Waist Company fire. He was known as an authority on hydraulic engineering and forestry, served as a conservation commissioner until 1915, and continued as a consulting engineer until 1917.

John drafted the Dix plan for state-owned hydroelectric development in New York. During the World War he served as a production manager for the Emergency Fleet Corporation. From 1919 to 1932 he engaged in the manufacture of machinery in New York. John became a technical adviser to the N.R.A. in 1933, following which he became a technical adviser of the National Labor Relations Board. In the latter capacity he adjusted many labor disputes in various cities of the country and for a time served as acting regional director of the board for the New York area. When the State Labor Relations Board was set up in New York in 1937 to assure full freedom in bargaining, Governor Lehman appointed him a member.

John had lived in Brooklyn for twenty-five years but recently moved to Manhattan to be nearer his business. He was a sponsor and teacher at the Crown Heights School of Catholic Workmen in Brooklyn. He was also a member of many Catholic organizations. Surviving him are Mrs. Moore, two sons, a daughter, two brothers, and four sisters.

Walter Champion Powers, X, of 134 Long Hill Street, Springfield, Mass., died on September 7. Following graduation Walter entered the Powers Paper Company of Springfield, of which his father was then president. He served as vice-president for many years and a few

1895 Continued

years ago became president of the company. During the earlier years of the Class he attended the reunions, but in later years his domestic instincts precluded active participation in class affairs. He was a member of the Colony Club, the Springfield Country Club, and the Longmeadow Country Club. Much of his time was spent in Worthington where he had a summer home. He was instrumental in founding the Worthington Golf Club and maintained much interest in its affairs. He was an accomplished fisherman, and keenly enjoyed the sport in many western Massachusetts streams.

A number of years ago he founded the Walton Club, which acquired rights along a trout stream flowing through Worthington and Huntington, Mass., where he engaged in his favorite type of fishing. Mrs. Powers survives him, as do three brothers. — While those on deck still have the opportunity, let us carry on the great spirit of the Class. — LUTHER K. YODER, *Secretary*, 69 Pleasant Street, Ayer, Mass. JOHN H. GARDINER, *Assistant Secretary*, 10 Clinton Place, Mount Vernon, New York.

1896

As seems to happen about every year for the second issue, there is a dearth of '96 news. Con Young and Abby flitted from Cape Cod on October 12 bound southward to Fort Myers, Fla., for the winter, and made stops en route to visit friends and family folk at Bridgeport, Conn., West Orange, N.J., Wilmington, Del., and Washington, D.C. It was also their thought that they might follow the east coast water route and have a short visit with vonHolst at Boca Raton, Fla. Con reported that he was in the pink of condition after his summer on Cape Cod, where he had a lot of physical exercise working around their summer home.

From Gaylord C. Hall in New York has come an account taken from the October issue of *Electrical Engineering*, which tells of the retirement of E. Arthur Baldwin as vice-president and European manager of the International Electric Company. Briefly, he started with the test course of the General Electric Company in Schenectady in 1896, was transferred to the railway engineering department in 1898, and later that same year to the foreign department. He became assistant manager of the foreign department in 1912 and manager of the department of Europe in 1919, later becoming manager of the Schenectady office of the International General Electric. He went to Paris in 1927 as general European manager, and became vice-president the following year. He has served as president of the American Chamber of Commerce in France and in 1939 was awarded that organization's gold medal for distinguished service. The French Government made him an officer of the Legion of Honor. The United States Government appointed him an observer at the International Labor Conference in Geneva, Switzerland, in 1934. He has also been active in the International Chamber of Commerce. He returned from Europe last spring and henceforth will make his home in Westchester, N.Y.

O. B. Denison, the six-eyed sleuth of '11, has sent the Secretary a clipping concerning Bob Fuller's daughter Nancy, who was graduated from North High School in Worcester in June, and is studying this year at the House of Pines in Norton. — A recent letter from Lewis T. Cannon in Salt Lake City mentions that one of his nephews, Geoffrey R. Cannon, is at the present time in his junior year in the Department of Chemical Engineering at M.I.T. — Billy Anderson, who had been spending the summer at his summer home at Biddeford Pool, Maine, was in Boston with Mrs. Anderson during the week of October 7, and the Secretary had a delightful luncheon with him on October 9. It was a pleasure to have Billy shown through the new Graduate House under the gracious guidance of Avery A. Ashdown '24, the housemaster. Billy remarked that housing at M.I.T. is now somewhat different from what it was when we were students. His son William is continuing his studies as a special student in the Department of Naval Architecture, studying boat design.

Wednesday, October 23, was a very significant date for Eugene C. Hultman in his capacity as chairman of the Metropolitan District Commission of Boston and surrounding territory, in that it marked the turning on of water at the new Norumbega reservoir in Weston, Mass. The act was performed by Governor Leverett Saltonstall, and was observed with appropriate ceremonies. The Secretary attended, and can testify to the fine presentation made by Gene Hultman of a concise story of the development of water supply for Boston and suburbs from the very beginning to the present day. The Norumbega high-level reservoir will be supplied through the recently completed new pressure aqueduct, which brings water eighteen miles from the end of the Wachusett aqueduct to the Norumbega reservoir for distribution. All of this is a part of the latest addition to the metropolitan water supply, the Quabbin reservoir, over forty miles from Boston. — CHARLES E. LOCKE, *Secretary*, Room 8-109, M.I.T., Cambridge, Mass. JOHN A. ROCKWELL, *Assistant Secretary*, 24 Garden Street, Cambridge, Mass.

1898

On the Class list there are a great many names of men and women whose connection with '98, or with the Institute itself, was very slight. Nevertheless, when notices are sent out the Secretary knows of no way to determine those members who will not want to receive them. It is therefore a gratification to the Secretary to receive the following note from Alice Weld Tallant, a distinguished physician and member of our Class: "Having once been the secretary of my class at Smith, I know that news from even the least-known members is sometimes welcome for the files. That is my reason for unloading the enclosed clipping on you. It is accurate enough (I was at the Women's Medical College for eighteen years, which may be defined as 'several'), and the likeness is as good as the usual newspaper cut.

"As I was a student in Physics for only one year at M.I.T., I naturally have no special association with the Class of '98, but I have a great interest in the welfare of M.I.T. and am really proud to be considered an alumna as a result of the brief connection." The clipping from the Philadelphia *Inquirer* of July 14, to which she refers, follows: "Obstetrician at Babies' Hospital, consulting physician at Sleighton Farms School and physician to the dispensary of St. Martha's Settlement House. Regional vice president for the Middle States of the American Unitarian Association. Chairman of the Church Committee of the First Unitarian Church of Philadelphia. Past president, charter member and now second vice president of the Philadelphia Unit, Women's Overseas Service League. She received her A.B. degree from Smith College and is now president of her class. Dr. Tallant received her M.D. degree from Johns Hopkins University. Awarded the Croix de Guerre for work in Europe during the World War. For several years she was professor of obstetrics at Woman's Medical College of Pennsylvania."

We noted last spring that Mrs. Jesse T. Lippincott of Cincinnati christened the U. S. destroyer *Gwin* at the Boston Navy Yard. — Frank F. Colcord, who is vice-president and manager of metal sales of the United States Smelting, Refining, and Mining Company, has been elected to the board of the American zinc Institute. — We saw in the Boston *Transcript* that Roger Babson's new book *Twenty Ways to Save Money* has just been published. We listened to Roger's speech of acceptance of the nomination of the New Prohibition Party for President of the United States. It was a good speech and contained much lofty idealism. At the end, when he urged his hearers to vote for him and assured them that a vote for a principle was never wasted, we wondered if he might not be a little blind to the fact that other candidates might have as sincere a desire to uplift the moral tone of the country and perhaps have more practical methods of accomplishing that end.

George Cottle is back in the harness again. Some years ago when he sold out his interests in the insulated wire business, he expected to travel and enjoy himself for the rest of his life. A couple of years ago, however, he undertook to advise in the management of a little factory which manufactures gears in southern Massachusetts. He is now working day and night and sometimes Sundays, and the business is expanding greatly and beginning to make sizable profits. — ARTHUR A. BLANCHARD, *Secretary*, Room 4-160, M.I.T., Cambridge, Mass.

1899

More of our members might take a leaf from the book of Frederick C. Waddell who has literally taken his pen in hand

1899 Continued

and written me a most interesting sketch of his trip through northern United States and into Canada this summer. It was a delightful trip, interspersed with incidents amusing and not so amusing. One of his first stops was at his home town in Massachusetts, where a celebration of the 100th anniversary of its establishment as a town was just closing. Sleeping accommodations were scarce, but finally a spare room was discovered. While Waddell was enjoying a talk about old times, however, a stranger got into his bed — a stranger in his cups — and it took some doing to put him out.

At New Haven, Waddell missed his old friend C. E. Smith '00, but at Rye Beach he and Mrs. Waddell had a happy visit with Carroll W. Brown and his wife. In Maine, he reports a splendid visit at the Bath Iron Works, where he found Newell and Pierce extremely busy building ships for Uncle Sam. They felt quite at home with each other because Waddell's work is along interlocking lines. Up from Bath to Houlton in the potato belt he traveled, and there found the old clock that used to grace the Boston and Maine Railroad waiting room in Boston for the convenience of the traveling public. Seventy years it served in the Boston depot and is still going strong. Across the border, then, to Canada and on to New Brunswick they went. There beside a little country church he found a tablet dedicating the church to "those New England Pioneers who in 1763 first settled here." There followed a statement of aims similar to that signed in the *Mayflower* by the Pilgrims in 1620. At Sackville, N.B., he inquired for Walter Wells but found he had not come North this summer. Then on to Halifax, Truro, and across the northeastern end of Nova Scotia proper he went, across Cape Breton Island to Sydney — another steel town, whose mills he could see only from the outside. This was disappointing, because Waddell is interested in mills.

Back over their course they traveled, then, to New Glasgow — a difficult trip, and one on which they needed a motor car that could swim. They followed the northeastern coast of Nova Scotia and New Brunswick to Campbellton, where they ferried to the Gaspé Peninsula. — Those who have traveled that way need no description. Those who have not been there would need to see it to appreciate it. The scenery was magnificent, but the roads were terrible. Waddell got out with two slashed tires and pleasant memories even though the Peninsula is entirely French — both as to names of towns and speech of the people. Sometimes he got what he asked for, and sometimes he didn't.

The most vivid impression Waddell carried away from Canada was that it is a most "saintly" place. Towns and buildings are named after saints. It occurred to him then that he might find a St. Frederick — the last his own name. At once he set about a search for such a saint, but disappointment was his only reward as he traveled mile after mile. Down through Nova Scotia and New Brunswick he quested without result. Into Quebec, the largest and most saintly province of them all, he rolled — but still no St. Frederick. Across Montreal and into the United States via Rouses Point and then on down through New York State there wasn't a sign. Then, without warning, he saw on a signpost "St. Frederick — 7 miles." He did not travel the seven miles, but will take that in on his next journey.

George Priest is still in Brattleboro, and I spend part of my time at Westmoreland, N.H. — There is a dearth of news at the moment, so other summer travelers would do well to recount their adventures. — W. MALCOLM CORSE. *Secretary*, 1901 Wyoming Avenue, Northwest, Washington, D.C. ARTHUR H. BROWN, *Assistant Secretary*, 53 State Street, Boston, Mass.

1900

Mekeel's Stamp News of April, 1940, published the following about Thomas D. Perry's *Guide to the Stamped Envelopes and Wrappers of the United States:* "This . . . is the only general publication on U. S. Postal Stationery that has been printed for some twenty years, and the earlier books are out of print and very difficult to obtain. It brings envelope information up-to-date, and its appearance is timely, now that envelopes are accorded definite catalog recognition, and have been made available at the Philatelic Agency. Much of the text has been reprinted from articles that have appeared in philatelic periodicals, but has been consolidated, revised, enlarged and brought up-to-date. The author is an engineer, eligible to a half-century stamp collectors' club, who has analyzed the envelope program in a rather unusual way describing the mechanics of envelope manufacture, and combining the usual philatelic approach with an interesting and informative narrative of envelope history. The book gives complete listings of envelope stamp dies, sizes, watermarks, papers and knives, with extensive tabulations showing the relationship of these characteristics. There are several hundred illustrations supplementing the tabular information. Drawings are given of every envelope knife and shape, quarter size, fully dimensioned with a clear description of distinguishing differences. The data in the book supplements catalog information, and no attempt has been made to list fully, except in the case of wrappers, which have never been clearly segregated from envelopes in any catalog. The bibliography is of unusual interest, as it covers general books, bulletins and catalogs, also philatelic periodicals. . . . The book is adaptable not only to envelope students, but also to the many collectors who want to secure a perspective of envelope collecting before adding this interesting side-line to their collecting activities. Its publication is a milestone in the rapidly growing popularity of envelope collecting."

Can anyone supply any information regarding the following: Eric W. Bailey, whose last known address was 83 Inman Street, Cambridge, Mass.; Robert H. Clary, 3846 Brunswick Avenue, Los Angeles, Calif.; William L. Fitzpatrick; Harris G. Hooper, 494 Third Street, Brooklyn, N.Y.; William R. McAusland, 2216 Davenport Street, Omaha, Neb.; James W. McIntosh, 60 Sheridan Street, Jamaica Plain, Mass. — During the summer, Walworth reported the death of his brother Gardner, Yale, class of '00. The younger Walworth was a classmate of the Secretary at Newton High School. — Edward E. Bugbee, who accepted an exchange professorship at Leland Stanford University, sends his home address: 628 Middlefield Road, Palo Alto, Calif. — In late September the Secretary had a telephone conversation with Woodward in Birmingham, Ala. Rick wanted all to know that he is feeling fine. He is pulling off quite a stunt with his iron company, the figures show.

The Boston *Herald* carried the following notice: "NORTH ANDOVER, Sept. 24 — Mrs. Sarah Frances (Bingham) Osgood, wife of Isaac Osgood, retired manager of the Boston board of fire underwriters and former member of the New England board, died today. Her home was at 46 Osgood Street. Mrs. Osgood was born in Lawrence, but had lived here since 1905. She was a charter member of the North Andover Historical Society and a member of the North Parish Church (Unitarian). She was active for many years in charitable work. Surviving are her husband, three sons, Isaac Osgood, Jr. of Marston's Mills, John B. Osgood, city editor of the Lawrence Daily Eagle, and Samuel Osgood, a daughter, Mrs. John E. Bennett, Jr. of Chatham, N. J. and a sister, Mrs. Emma Griffin of New York."

Jim Batcheller writes: "Well, as I look back on it the reunion was a fine event. I hope to be able to attend more of them, especially in '45 and '50 — that's far enough ahead to plan at this time! Right after Alumni Day I went to Annapolis and saw my youngest son sail on the midshipman's practice cruise to the Panama Canal, Guantánamo, Cuba, and so on. . . . From Annapolis I went to the Rotary International Convention at Havana, June 9 through 14, and it was interesting but climatically uncomfortable; not so very hot, but the humidity was around 90! I was not impressed with any feeling of stability or dependability there in case of war stress. There are too many 'have-nots' in their population to be constant in any direction for long. I did not reach home until nearly the end of June, having made visits in California. Piles of work awaited my return and some pleasures, too. One of my sons and his wife came from California and spent part of their vacation with me. A few days ago I enjoyed a visit from Bob Leach's youngest daughter and her husband, who were west on a vacation trip. I send kindest regards to you and all others of the Class. I hope if they vacation in this direction they will call here."

Mr. and Mrs. Robert Howland Leach announced the marriage of their daughter Eleanor to Dr. Carl Errett Swartz on Satur-

1900 Continued

day, September 28, 1940, at Fairfield, Conn. They are at home at 3363 Warrcasville Road, Shaker Heights, Ohio. — Sperry kindly sent some snapshots, taken at the reunion, of Grant, Russell, Walworth, Ziegler, and himself. On the day they came there appeared in the *Herald* a photograph of Mr. and Mrs. Marcy L. Sperry, Jr.,'34, of Newton Centre about to sail on the liner *President Roosevelt* for Bermuda. Mrs. Sperry, Jr., is the former Virginia B. Kimball, daughter of Mrs. Bartow Kimball of 329 Ward Street, Newton, Mass.

Atwood writes: "It has taken me a long time to answer your very kind and thoughtful letter reporting on the conventions at the reunion at East Bay Lodge. For my part, I had looked forward to this reunion with a great deal of anticipation and it was a disappointment to me that I was unable to attend. I hope this will not happen again." — Since the last issue, besides the above, we have seen or heard from the following: Maurice Davenport, who is now in New Canaan, Conn., Blair, Burns, Davis, Draper, Fitch, Hapgood, Ingalls, George Leach, Neall, Patch, Russell, Silverman, and Charlie Smith. — C. BURTON COTTING, *Secretary*, 111 Devonshire Street, Boston, Mass.

1901

Before perusing these notes, please, if you have not already done so, carefully read the annual class letter which should have been received some time ago, and in addition to sending any news items about yourself or any other '01 man, please advise your Secretary as to your choice of a meeting place for our fortieth reunion. — Class notes for the November Review had to be brief so will now comment seriatim on all items which have accumulated since last May when the notes were prepared for the July Review.

Notices of Lammot du Pont's resignation as president and election as chairman of the board of E. I. du Pont de Nemours and Company were received just too late to be included in that edition. Lammot du Pont since graduation from M.I.T has spent nearly his entire business life with Du Pont de Nemours and Company. He was elected president of his company in 1926 and during his regime the company has become one of the most diversified and largest chemical corporations in the world. The Class is, therefore, most delighted that Lammot has not resigned as Class President and trusts that his duties as chairman of the board for the Du Pont Company will fortunately allow him to preside at our fortieth reunion next June.

Ellis Lawrence, who was Class President during our senior year, and who continued as President until 1906 when he deserted the east for the Pacific northwest and has since had a distinguished career as an architect in Oregon, recently (to be exact on April 2 and 3) was honored by his fellow faculty members of the School of Architecture and Allied Arts of the University of Oregon by being presented with a silver bowl in recognition of his twenty-five years of service as dean of the school since it was founded in April, 1915. President Donald M. Erb of the University made the presentation and William Emerson, Dean Emeritus of the School of Architecture at M.I.T., was a featured speaker for the celebration of the twenty-fifth anniversary of the school which has had a splendid growth under the direction of Ellis Lawrence and which now has enrolled more than 300 students. Ellis is a member of the architectural firm of Lawrence, Holford and Allyn of 918 Fairling Building, Portland, Ore., and Bill Holford, one of his distinguished partners, is also one of our classmates. Holford is State Architectural Inspector for Oregon and is high in the councils of the Boy Scouts of America. Ellis made a visit east in 1939 although we were not so fortunate as to see him. We hope both he and Holford will attend our fortieth reunion next year.

Al Higgins, President of the Florida Power Corporation at St. Petersburg, Fla., also makes occasional visits up this way and we were very sorry to miss his call when he was in Portland, Maine, this summer. Al, who was recently elected president of the Southeastern Electric Exchange, has devoted nearly thirty years to the utility business and has also been progressively active in many civic and trade organizations. We will surely hold him to his promise to be with us next June.

According to a Boston newspaper, Johnny Ross, who is a native of the good old State of Maine, and who since 1911 has been on the faculty of Clarkson College of Technology, Potsdam, N.Y., and for a number of years dean of administration, was on June 15 elected president of the college. Ross was a popular member of Course XIII and we of that Course send our congratulations and will look for him at our reunion.

Word comes from Worcester, Mass., that George Cross, who as Director of Worcester Historical Society is greatly enjoying his retirement from the Army, has recently unearthed a contraption known as a "Technicon" and intended to exercise the fingers of would-be pianists. Captain Cross has many other interesting exhibits at the museum of the historical society and from personal experience your Secretary can vouch for the enjoyment of a visit with Captain Cross some afternoon when in Worcester. — During August, J. Russell Putnam, II, of the Waterbury Clock Company, Waterbury, Conn., made a vacation visit to Portland with his wife. Russ said all was well with him and that he hoped to be on hand for the fortieth.

According to the Alumni Office, Charley Bittinger has acquired a new title, that of lieutenant commander, and is stationed at the Naval Research Laboratory, Anacostia Station, Washington, D.C. Sounds interesting. We hope Charley can tell us more about it personally.

We must now regretfully chronicle the passing of three more members of our Class, namely, Alfred C. Jennings, XIII; Walter P. Davis, III; and Matthew C. Brush, II. — Jennings's address has been missing for a number of years and as the Alumni Office gives the date of his death as June 15, 1927, we hope some classmate can furnish more complete information.

Davis died on September 15. For many years he had been associated with the Towle Manufacturing Company of Newburyport, Mass., and about two years ago your Secretary had a short visit with him at his office. Davis was then in apparently fair health and indicated his intention of renewing his contact with class affairs.

Matt Brush had been in poor health for several years and his death occurred on October 15. Matt had an amazing career and among other important positions he brilliantly served as President of the Boston Elevated Railroad, of the American International Shipbuilding Company at Hog Island during the World War, and of the American International Corporation. He was reputed to have held more directorships than had ever been held at one time by any other individual. Matt was a bachelor most of his life, but married in 1933 and lived at a most attractive estate at Shorehaven, Conn., his very special hobby being the collection of elephants of every kind and description. Matt was an interesting chap when he was at Tech and he became increasingly so during his whole life. Those who knew him best will miss him much. — ROGER W. WIGHT, *Secretary*, The Travelers Fire Insurance Company, Chapman Building, Portland, Maine. WILLARD W. DOW, C.P.A., *Assistant Secretary*, 20 Beacon Street, Boston, Mass.

1904

Sometime last spring I received from Charles E. Locke'96 an announcement of the pending publication of the new second edition of *An Outline of Metallurgical Practice* by Carle R. Hayward. I gather from the publisher's synopsis, too long for inclusion here, that this must be an outstanding volume and one of great value to students and others interested in metallurgy. — On Saturday, April 20, Elizabeth Stickney, daughter of Mr. and Mrs Oscar G. Thurlow, was married to Allan Harvey Woodward, Jr., at Birmingham, Ala.

In April I received letters from Bill Evans, Selby Haar, and Easterbrooks enclosing clippings regarding the death of Walter J. Gill. Evans also writes: "As for myself, I have not kept you very well posted. I have been such a wanderer in the past four years — Atlanta, Detroit, and now Cleveland — it has been hard to keep track of myself. Anyone connected with the air-conditioning business is likely to be bounced around as I have been. It has been a grand scramble. I do not find a single classmate in Cleveland. As the years are piling up on all of us, it is noticeable that the alumni group here includes much younger men, and we have hard work butting in. There are prospects of my staying here, but who can tell? It is somewhat a strange experience, after living twenty odd years in one home."

1904 Continued

Haar gives us a personal note about himself: "I am still on the same line of work, equipment of the rapid-transit subways of New York City. The biggest thing in our lives is that the city is taking over the two privately operated subways and soon will have under unified operation transit properties valued at some one and one quarter billion dollars, or $1,250,000,000, whichever looks bigger to you. I seldom see any of our classmates, but when I do I notice that their polls look frostier and frostier. It does not show so much on me." Easterbrooks closes his letter with this paragraph: "Last summer I stopped at Old Lyme — Boxford Manor — to see if any of my acquaintances were there. The boy at the desk said some were playing golf, some were swimming, and others were just lying around. My wife suggested that I belonged in the third group so I decided to move on. Too bad that's the closest I have come to attending a 1904 reunion." — All I can say to Easterbrooks is that he is unique in being the only classmate I know who actually appeared at the locus of a 1904 reunion without participating in it, so he does not know what he has missed.

Dwight Fellows is now with the state planning board, located in the Statehouse, Boston. I am not certain just what the board is planning, but we can be sure it must be something better as long as Dwight has anything to do with it. — Our representation at Alumni Day, June 3, was not very large, but we managed to make ourselves known at the dinner at the Hotel Statler in the evening. The classmates present were Fellows, Moore, Parker, Gene Russell, Stevens, and Whitmore. — On June 12 Ed Parker and Mrs. Lilla Stebbins, widow of our classmate, Charlie Stebbins, were married in Reading, Mass. We are all very happy for them and give them our heartiest congratulations and best wishes.

The annual reunion was held at Boxwood Manor, Old Lyme, Conn., on June 21, 22, and 23, and as usual the Boston contingent met at the University Club for lunch on the twenty-first. Those present were Comstock, Dennie, Fellows, Galusha, Moore, Munster, Gene Russell, Sutton, and Stevens. After a couple of hours of good fellowship we departed for Old Lyme, collecting Jack Draper in Canton.

We arrived in Old Lyme about six o'clock in good condition. There is no use in trying to describe a reunion to the nonparticipants, and those who were there do not need a description. The weather was fine, the spirits good, and the companionship unexcelled. For two days we did not know there was a war in the world or an impending presidential election, and the years fell away from us — except when some of us tried to play too many holes of golf. The roster of attendants follows: Freeman Cobb, Dan Comstock, Warren Currier, George Curtis, Frank Davis, Mrs. Davis, and daughter, Jack Draper, George Fairfield, Dwight Fellows, Charlie Haynes, Everett Hiller, Charlie Hoy and Mrs. Hoy, Harry Kendall, Lang and Mrs Lang, Gus Munster, Karl Peiler, Gene Russell, Dave Sutton, and Tripp and Mrs. Tripp. It was a wonderful crowd and one of the best reunions we ever held, although we missed some of the old stand-bys like General Holcombe and Mert Emerson.

You will remember an item in the notes last May regarding the Modern Pioneer Awards for outstanding achievements and inventions which have been instrumental in the advancement of better conditions of life in America. These awards were sponsored by the American Association of Manufacturers, and we stated that Herb Kalmus had received such an award. At the reunion we learned that two more of our classmates, Karl Peiler and William P. Bentley, have received Modern Pioneer Awards. Peiler is now vice-president of the Hartford-Empire Company in Hartford, producers of machinery for making glass bottles, and his award was for effort and achievement along that line. Since 1910 he has been engaged in this work and is the sole inventor of 147 United States patents relating to the glass business. His inventions for the feeding of molten glass into the shaping machines revolutionized the industry and are now accepted universally as standards.

I am indebted to Peiler for the information regarding Bentley, and I quote from his letter: " . . . As you probably know, Bentley went to Texas for Stone and Webster and ended up in the construction and contracting business in Dallas. He founded the Uvalde Construction Company, which used a great deal of bituminous mixture for paving purposes. Bentley discovered how to make the natural bitumens available so as to avoid the addition of asphalt or other outside plasticizers. As a result of his investigations natural deposits of limestone and sandstone were made available at a greatly reduced cost. Most of Texas is paved with materials produced by Bentley's method and the use has extended to other states."

Currier Lang sent me a letter which he received from Arthur P. Porter about August 1, and I am passing it along to you: "I secured an appointment as structural designer in the office engineering division of the Panama Canal and sailed from New York on May 16 on the S.S. *Cristobal* of the Panama Line. The boat is new, the very latest and best in every way: lovely modernistic interior decoration with concealed lighting, pastel colors, soft blue carpets, silent turbine-driven propellers, swimming pool on deck, open veranda sitting-room for each four or five staterooms, which could be converted into a gun mount if necessary, lovely dining room with good meals well served. I was assigned a seat at the ship's doctor's table with two ladies, one of them from Mansfield, Mass., taking the round trip as a vacation, the other, the wife of Dr. Carry, chief health officer on the Isthmus for thirty years or so.

"The stop at Haiti was interesting, as this was my first travel in a foreign country. I heard a different language (French), saw differently colored people, different vegetation, different customs. We watched native boys around the ship diving for pennies. Someone threw five at once, and a boy got four of them. Then we sailed for three days more across the Caribbean with moonlight on the water, dancing on deck, and days with nothing to do but rest, eat, and sleep. The weather here at Panama is cooler than you have been having. I have four jobs on my schedule: a storehouse (for steel and cable) 300 feet long, 60 feet wide, with steel columns and roof trusses, twenty-ton crane, and concrete racks. Second job, another storehouse for the Panama Canal Press, steel trusses. Third, a movie theater; and fourth, a gymnasium for girls, the latter two to be reinforced concrete.

"I live just opposite Albrook Field, where there must be fifty army and navy planes. Every day they go up, and at night there are thirteen searchlights from the hills on them. I am expecting Mrs. Porter and Carol to arrive about September 1. Then I shall move into family quarters and Carol will go to the junior college here for one year. At present they are in Massachusetts at the hostel in Sunderland. Carol is busy plastering and painting and clearing out my work room, as I called it, where I kept my tools and materials. — Sorry not to be at the reunion this year. I enjoyed that game of croquet with Mrs. Lang. Best I can do here is chess and Chinese checkers. I have a canvas camp chair out on the terrace, and I watch the lights come on in the flying field buildings and in the villages of Ancon and Balboa. It is beautiful here in its own tropical way.

"Newspapers are printed half in Spanish, half in English; the radio, too, is half and half. Walking about Panama City one sees many strange sights. Bananas are good, but most fruit and vegetables are brought from the States."

Mert Emerson sent me the front page of the July issue of *Technicolor News and Views* which shows a fine picture of Herb Kalmus with the following item: "Dr. Herbert T. Kalmus has been re-elected President of Technicolor, Inc., at a meeting of the board of directors at New York. Dr. Kalmus' re-election, commented Box Office Digest, was 'not surprising in view of the strong position in which he has placed the Company.' " Mert also said that Currier and Carolyn Lang's oldest daughter, Frances, became a mother on July 28, and also that their second daughter, Alice, married Sherman Adams on August 23.

I am indebted to Merton W. Sage '07 for the following biographical sketch of Walter Gill, which was prepared for the yearbook of the New York Patent Law Association: "Walter Josiah Gill, a member of the Association, died at his home in Kew Gardens, Queens, on April 3, 1940, after an illness of three years. Mr. Gill was born in Roxbury, Mass., on May 6, 1879, the son of Walter Josiah and Emeline Gill. He attended the Boston Public Schools, was graduated from Massachusetts Institute of Technology in 1904, and for the next three years was an

1904 Continued

instructor in Physics at the Institute. He entered the United States Patent Office in September 1907, and served for several years as an Assistant Examiner in Division 26. While in the Patent Office, he studied law at the Columbia Law School in Washington, from which he received the degree of LL.B. in 1912. He was admitted to the bar of the District of Columbia in 1914, and the New York State bar in 1922.

"In January 1917, Mr. Gill resigned from the Patent Office and entered the office of Pennie, Davis, Marvin & Edmonds, New York City. In 1920, he became associated with the late Henry M. Moakley, under the firm name of Moakley and Gill, as patent attorneys for the Ford Instrument Company of Long Island City. After Mr. Moakley's death in 1933, Mr. Gill continued as patent attorney for the Ford Instrument Company until his last illness. He was a member of the American Bar Association, the New York Patent Law Association, The University Club of Washington, and the M.I.T. Fraternity Club of New York City. Mr. Gill was married on Feb. 18, 1915, in Washington, to Katherine Nottingham, the daughter of Julian R. Nottingham, a Washington patent attorney. He is survived by his wife, his mother, Mrs. Emeline B. Gill, and two sisters, Miss Amy Gill and Mrs. Elizabeth Rogers, of Newton, Mass.

"Universally respected and admired, Mr. Gill possessed those sterling, inbred qualities characteristic of his New England ancestry and education. He combined sturdy honesty and intellectual integrity with a pleasing and kindly personality, always ready to lend a helping hand to a fellow. While in the Patent Office, he was a pillar of comfort to newly-arriving Assistant Examiners, especially from New England, with his genial acts of welcome and wholesome advice. Always a gentleman, he practised his profession with conscientious regard for the triumph of truth and righteousness, and with a remarkable understanding of and tolerance for his adversary's position and views. His untimely passing is a distinct loss to his numerous friends and associates and to the profession he so conscientiously and faithfully served for over thirty years."

Henry P. Drake died in Harrisburg, Pa., on April 19. — Sumner E. Brown, 59, retired illuminating engineer and inventor of the Brown reflector, widely used in automobiles after the World War, died on May 19 of a heart attack at his home, 26 School Street, Dedham. Born in Springfield, Mr. Brown was educated in the Springfield schools. During the World War his reflector was used in lights for aviation landing fields and he formed a company, Brown Reflector, Inc., which he headed. He retired in 1920. He leaves his widow, Martha May Brown; three daughters, Mrs. James Otis of Needham, and Mrs. Douglass Grearson and Miss Betty Brown of Dedham; and two sons, Sumner, Jr., of West Roxbury, and Roland of Dedham. — Howard M. Brown died in Rockport, Mass., July 26. — HENRY W. STEVENS, *Secretary*, 12 Garrison Street, Chestnut Hill, Mass. AMASA M. HOLCOMBE, *Assistant Secretary*, 4817 Woodway Lane, Northwest, Washington, D.C.

1906

Ray Barber, III, has resigned as dean of the Alaska School of Mines, a position which he has held for the past three years and, upon completion of consulting work which he has undertaken for the summer, will return to the United States. — Guy H. Ruggles, III, formerly mill superintendent of the Inspiration Copper Company in Arizona, is now in Cananea, Sonora, Mexico, where he is associated with the Cananea Consolidated Copper Company. In a letter of June 16 which Guy sent to Henry Darling, Class Agent, he advised that he expected his new position to include a much wider field of activity than his former responsibility.

The following is taken from the Lowell, Mass., *Courier-Citizen* of June 18: "Professor Herbert J. Ball, head of the department of textile engineering at the Lowell Textile Institute, has been nominated as vice president of the American Society for Testing Materials of Philadelphia, according to word received here last night. He will take office at the society's 43rd annual meeting to be held in Atlantic City from June 24 to 28. Professor Ball received his B.S. degree in mechanical engineering from Massachusetts Institute of Technology in 1906. Later he completed a course in professional accountancy and received the degree of B.C.S. in 1916 from Northeastern University. A member of the faculty at Lowell from 1906 to 1918, he was made head of the Textile Engineering department in the latter year. As an active member and chairman since 1930 of one of the society's largest and most active committees, Committee D-13 on Textile Materials, he has contributed notably to the advancement of standardization and research work in this field. During the years that he has been chairman some of the committee's outstanding accomplishments have been made. He was a member of the society's executive committee in 1934 to 1936 and again from 1939 to 1940. He also renders service as a member of Committee E-6 on papers and publications. In addition to the A.S.T.M., he holds membership in the American Society of Mechanical Engineers, U. S. Institute for Textile Research and the British Textile Institute."

Looking over the June Review, the Secretary was interested to note the advertisement of E. B. Badger and Sons Company, which appeared on the inside of the front cover of that issue. The announcement in question included the roster of the Technology graduates with that concern, and the list was headed by C. R. Burleigh, II, and H. C. Merriam, II, of our Class. They are connected with the main office in Boston. — On June 24, Dana Wood, I, called on the Secretary. Dana was on his annual vacation. He is with the Tennessee Valley Authority and now lives in Knoxville, Tenn., but retains his old home in Belmont and spends his vacations visiting friends and former business associates. He has three children and four grandchildren. Speaking of grandchildren, we are pleased to announce that Mr. and Mrs. Frank Benham, I, have joined the ranks of those who are entitled to grandparent honors. A daughter, Brenda, was born to Mrs. F. A. Benham, Jr., at the Framingham, Mass., hospital on July 12.

While indulging in these personals affecting the younger generation, we record two marriages. Elizabeth Wight, daughter of Mr. and Mrs. Malcolm G. Wight, I, was married to Carlton S. Redman, Jr., on Saturday, August 17, at Marion, Mass., where the bride's parents have a summer home. Also, the Secretary is happy to announce the marriage of his son, J. Norton Kidder to Priscilla E. Comins of Quincy, Mass. The wedding occurred in that city on Friday, August 23. Norton was graduated from Harvard in 1937 and is now with the Employers' Group Insurance organization in Boston.

Apropos of these last announcements we reproduce part of a letter from Harold Coes which was much appreciated by the Secretary: ". . . My youngest son, who is a fourth-year medical student at Columbia School of Physicians and Surgeons, has just announced his engagement, so we are in the process of ultimately acquiring another daughter-in-law. My oldest son is married. Charlie Howard is in Venezuela on some work for us, but he is expected back the latter part of this month. Doubtless you know he has been associated with us for several years. Mrs. Coes and I took a long vacation trip, which we greatly enjoyed, to the Canadian Rockies and up to Alaska."

Readers will be interested to know that the Class was well represented at Alumni Day on June 3. Otto Blackwell came from New York to attend the communications conference, and others there were Frank Benham, Stewart Coey, Ray Philbrick, Ned Rowe, and your Secretary. These members and several others attended the luncheon, and we were honored by the presence of Mrs. Coey and Mrs. Wight. After the luncheon Mr. and Mrs. Coey left for their summer home at Squirrel Island, Maine, where Stewart was planning to get in a week's fishing before returning to New York. At the reunion dinner in the evening ten members of the Class filled one of the round tables — W. G. Abbott, Frank Benham, Otto Blackwell, Sherman Chase, Sam Nash, Ray Philbrick, Ned Rowe, Abe Sherman, Malcolm Wight, and the Secretary. Tom Hinckley, Tony Mathesius, and Walter Trask were in the hall and visited the class table during the evening. Coey, Trask, and Sherman attended President Compton's annual dinner the night before Alumni Day. It was a particular pleasure to greet Trask — we had not seen him for so many years. Therefore, it seemed all the more of a shock when word was received of his death on September 1. The following is taken from a Salt Lake City paper: "Walter H. Trask, Jr., 57, 1341 Second Avenue, for many

1906 Continued

years a prominent mechanical engineer in Utah, died . . . in a Salt Lake hospital after a several weeks' illness. Mr. Trask had been a resident of Salt Lake City for 30 years and was prominent in activities of St. Mark's Episcopal Church. He was born in St. Louis, Mo., April 7, 1883, a son of Mr. and Mrs. Walter H. Trask. . . . He assisted in electrification of the New York, New Haven & Hartford Railroad. When that work was finished, he moved to Denver, Colo., where he resided until 1910, when he came to Salt Lake City. For many years he was employed by the Salt Lake Hardward Company as an engineer. During this period he also was a member of the engineering staff of the Idaho Power Company. In 1938 he joined the Riter Engineering Company of Salt Lake City, with which he was associated at the time of his death. Mr. Trask was a junior warden and vestryman of St. Mark's Episcopal cathedral, and for many years was a board member of the corporation of the Episcopal Church, diocese of Utah. He had served as a delegate to the annual convocation of the Episcopal Church and had been elected alternate deputy to the general convention of the church. He also was a member of Phi Beta Epsilon, honorary engineering fraternity; the Utah section, American Society of Mechanical Engineers, of which he was past chairman, and the University Club. Surviving are his widow, Mrs. Elizabeth Trask; a daughter, Catharine Randolph Lee Trask; two sons, Walter H. Trask III and David B. Trask, all of Salt Lake City; his father, Walter H. Trask, Sr., Denver, Colo., and two sisters, Mrs. Godfrey Parkerson of South Orange, N.J., and Mrs. Alonzo Lilly, Denver."

Classmates present at the June reunion referred to our thirty-fifth in June, 1941, and agreed that every effort should be made to have it the best one to date. When you read these notes in December it will be but six months away. Therefore, it is not too early to make plans to attend. It will be held at the Oyster Harbors Club, where we met in 1931 and 1936. The dates are May 30 to June 1 inclusive. Reserve these days and make your plans now to attend. — JAMES W. KIDDER, *Secretary*, Room 802, 50 Oliver Street, Boston, Mass. EDWARD B. ROWE, *Assistant Secretary*, 11 Cushing Road, Wellesley Hills, Mass.

1907

In the July Review was reproduced most of a letter received from Birendra C. Gupta, Burnpur, via Asansol, East Indian Railway, India. In June I received a note from Hugh Pastoriza, 70 Pine Street, New York City, enclosing a copy of a letter, dated March 12, which he received from Gupta, and which supplements most interestingly and instructively the former letter from our loyal far-eastern classmate. Part of the message follows: ". . . You want to know what my work consists of as town administrator of the Indian Iron and Steel Company, Ltd. There are four separate townships over which my work is spread. The company has a big works at Burnpur and another one at Kulti, separated from each other by about ten miles. Each of these concerns is now engaging from nine- to ten-thousand men. The Steel Corporation of Bengal, Ltd., which has just been installed, has about six thousand men working in it. We have also the Indian Standard Wagon Company, Ltd., at Burnpur, employing about 3,500 workmen. The new towns are being built up very rapidly with large numbers of labor quarters, staff quarters, and amenities that go with such towns, and the town administration department has jurisdiction over the following: (1) town engineering (roads, buildings, water works, drainage, and so on); (2) sanitation; (3) medicine and hospitals; (4) watch and ward and policing; (5) dairy farm; (6) educational institutions; (7) aerated water factories; (8) ice plants; (9) meat and fish markets — bazaars and shops; (10) clubs and institutes, and so on.

"The work is very interesting and fresh problems are forever cropping up. The company has provided me with a house, free of rent, and Ethel has made a beautiful garden and lawns out of what was a rock-strewn wilderness about a year and a half ago. The company provides free electricity, free motorcar and gas, also a chauffeur, gardeners, and compound sweepers. I do not know of any other companies who are so generous in these respects towards their employees. We have very fine social clubs and cinemas within our towns, and, within easy motoring distance, large collieries, railway colonies, and an aluminum corporation, where there are many social clubs and cinemas. There are thousands of miles of beautiful motoring roads in every direction, not the least of them being the Grand Trunk Road which connects Calcutta on the east side of India with Peshawar on the northwest. The distance is about 1,600 miles. Although the roads in India, which are mostly Tarmaced, do not compare with the concrete roads of the United States, I believe that India in spite of its size will soon have a very large network of good motoring roads. Three years ago a road board was formed and a petrol tax levied by the central government. A very large sum of money, expressly set aside for road development, has thus been accumulated. Once this road system with trunk roads is built, large companies which at present are not developed because they lack transport will have their produce brought to good markets. This naturally means the development and prosperity of India.

"While radios give us garbled and untrue versions of what is going on in the various European theaters of war, we in India have ceased to believe in the authenticity of news in the papers. Out here, apart from the fact that the price of a few imported canned goods has gone up, the cost of living has hardly altered. We have a market supervisory committee at Burnpur which helps the town administration department check current prices for staple articles, kerosene, sugar, cloth, and the like. So far we have practically no rise in prices and all provincial governments in India are ruthlessly putting down profiteering. Though we have hardly felt the effects of this great war, we do not allow ourselves to think that this state of security will last indefinitely. Germany and Russia are bound to turn soon to the East for a diversion, but eastern countries have had time to prepare themselves for such eventualities. Let us pray that this cursed war comes to an end soon, before civilization is wiped out by the forces of destruction. I should like to hear how things are in America. The United States, I know, is doing a great deal in the cause of the Allies, and I still believe that the U. S. A. is the only country that can bring about a state of peace among the belligerents. You should not, therefore, withhold your hand by following the old Monroe Doctrine. The Rotary movement started by an obscure lawyer in Chicago has not only captured the imagination of America and Europe. The East also finds the Rotary a source for bringing the world troubles into a state of order and fellowship. We have recently had a big Rotary conference of the eighty-eighth district at Calcutta, and the Calcutta Rotary Club had a splendid program of discussions of great social value, bringing the Rotarians and their families together. Ethel and I, as guests of the Calcutta club, had a splendid time.

"I shall be fifty-nine next December. Ethel left for Jubbulpore last evening to stay a month with my two youngest daughters, Eunice and Tara. Jubbulpore is in Central India and is 601 miles from here. The journey takes about sixteen hours. My eldest daughter, Comala, resides in Calcutta. She is now doing a good deal of work in organizing radio broadcasts (women's department) and in giving broadcasts herself. Comala lost her husband about two-and-a-half years ago. She has one son — five years of age. Eunice, my second daughter, has married a military doctor who holds the rank of captain in the Indian Medical Service. He is a surgeon specialist in charge of surgical wards in the British and Indian military hospitals at Jubbulpore. He is also honorary surgeon of two civil hospitals in that district. My daughter Eunice lost her nine months' old baby about six months ago. My youngest daughter, Tara, has married a businessman whose headquarters are in Bombay. She has a healthy son about fifteen months old. Ethel seems to be perfectly content to live here in India. She lost her mother, Mrs. Colcord, aged ninety-one, last December.

The East Indian Railway is one of our biggest systems in the country, having about 5,000 miles of rail. The Northwestern Railway has about 7,000 miles. The approximate total mileage of railways in India is 37,000. Considering the size of the country, this is really very small, but as long feeder roads, served by lorries and busses, are rapidly coming into existence, this shortage will soon be eliminated.

"At the last Rotary meeting in Calcutta I was surprised to find four other Technology men. The Bengal Engineer-

1907 Continued

ing College, where I worked for nineteen years as professor, has now appointed a new principal who was graduated from Technology, obtaining his Sc.D. degree in 1932. He is a very young person to be the principal of the premier engineering institution in Bengal, but I have come to the conclusion that he is fully capable of taking care of that institution."

In The Review of December, 1937, we told about the doings of Howard McChesney, 411 Bryn Mawr Avenue, Cynwyd, Pa. At that time he was electrical engineer with Philadelphia Gear Works, but he left that concern in December, 1938, to become chief engineer for the Kitson Company, whose factory is at 2409 West Westmoreland Street, Philadelphia, and executive offices at 1500 Walnut Street in the same city. A fine letter, dated September 26, from Mickey follows: —

"Kitson Company is primarily engaged in the manufacture of plumbers' rough brass goods — ground key cocks, principally. It is the manufacturing subsidiary of the Welsbach Street Illuminating Company, and sometime since absorbed the duties of the old Penn Globe Company, manufacturing the street gas lighting items, lamps, posts, automatic controls, and so on. Shortly before I joined them as chief engineer, they started to manufacture ozone generators of larger capacities, primarily for the treatment of municipal water supplies. The first plant, built for experimental purposes, was applied to the purification of sewage affluent, to render sterile the water eventually to be dumped into the river, and that meant also to satisfy the oxygen demand of that water so fish life would not be destroyed. Following that a number of pilot plants were distributed for test of the process on local water supplies. One of these was on the southern Lake Michigan water where the burden of oil refinery wastes was especially heavy and the taste and smell was quite like a perfectly good crankcase. Chlorine and other chemicals were doing a good job as far as bacterial content was concerned but could do nothing with the taste or smell. Ozone did, however, and a plant was installed and is now operating, apparently with satisfactory results. Another pilot seems to be leading to results on a supply where chemical and sugar-beet wastes are involved. The process is not new — quite in vogue on the continent — but has been subject to much adverse publicity here because of insufficient capitalization and the resulting high costs, lack of service, and what have you. Naturally, political contact is vital, for approval must be had from the various health organizations. All of this has meant considerable research and development of design. It is remarkable how much has been written on the subject in a cursory manner, and how little of factual data is in the lot.

"As for the family, the number is the same as last, except for the addition of a son-in-law. Constance was married on October 9, 1937, to Carl Frederick Brauer '30, VI, who had to leave M.I.T. because of his father's death and the subsequent absconding by the administrator. He later ('34) was graduated from Princeton, and received an M.A. in architecture in 1937. He is following that game in New York City, and Constance has preferred to keep on with her work — now associate editor in the New York office of the Fawcett Publications, Inc. Mary was graduated from the business administration course at Syracuse University in 1938, and is now with the Bell Telephone Company of Pennsylvania. Helen is in Lower Merion Junior High School — her last year there with three to go in senior and then college, if, when, and where."

A brief personal note received on September 30 from Charles Bragdon, whose home address is Rock Ridge Road, Larchmont, N.Y., said that he had seen Phelps Swett and Harry Moody recently and that both were looking fine. — The October issue of *Fortune* contained a long article about Bausch and Lomb Optical Company in which the activities of our classmate, M. Herbert Eisenhart, company president, were commented on in a complimentary manner.

Information received in September from Cornelius Simmons Fleming, X, enable me to record something of his history since 1907. A graduate of Washington and Jefferson College in 1905, he entered the Institute at the beginning of our junior year. From 1907 to 1910 he was a chemist with Procter and Gamble in Cincinnati, and then until 1916 occupied a similar position with James B. Sipe and Company, Pittsburgh, paint and varnish manufacturers. Two years as chemist with Cook Paint and Varnish Company of Kansas City followed, and then from 1918 to 1935 he was superintendent of the paint department of Paraffine Companies, Inc., in San Francisco, Calif. Since 1935 he has been on his own as proprietor of a concern called Alumileaf Company. His business address is 5127 West Boulevard, Los Angeles, Calif. He has several patents for paint, roofing material, and filler for gas-mask canisters, and has applications on file for others. He was married on January 1, 1908, and has a daughter, Laura Elizabeth, who married W. H. Bell and lives at 1809 43d Street, Sacramento, Calif. He also had a son, Tom, born in 1914, who died in 1928. — BRYANT NICHOLS, *Secretary*, 126 Charles Street, Auburndale, Mass. HAROLD S. WONSON, *Assistant Secretary*, Commonwealth Shoe and Leather Company, Whitman, Mass.

1908

The second get-together dinner of the season will be held at Walker Memorial on Tuesday, January 14, at 6:30 P.M. Make your plans now to come. — We should like to get correct addresses for several classmates of whom we have lost track. Can anyone help us? Mail has been returned from the following: Sahak Melkon Chuchian; John H. Bossong, whose last known address was 451 West 46th Street, New York, N.Y.; Sherwood Hall, Jr., 250 South Lafayette Street, Grand Rapids, Mich.; Orrin S. Lyon, 250 Cross Street, Malden, Mass.; Earl B. Lyons, 2 Liberty Street, Saugus, Mass.; Chester L. Prichard, A. W. and C. L. Prichard, Mannington, W.Va.; and Samuel T. Silberman, 817 Hollins Street, Baltimore, Md.

I am glad to report that Bill Booth is much improved in health and he says he is going strong. Cookie recently received the following letter from Gus Weiler: "Class news in The Review has been extremely limited the last decade or so. My son said to me the other day, 'Dad, your Class at Tech must have been a bunch of dead ones.' I said, 'How so?' He said, 'They never have any news in The Review.' I had to explain to him that '08 was by no means a bunch of dead ones but that the lack of news was due more to inactivity of the class officers than to lack of quality in the membership. Perhaps it is also the fault of some of the members not sending any news in without urging.

"For the past eleven years I have been engaged in private engineering practice here (West Chester, Pa.). The diversity of my practice exceeds that of the old-time country doctor — no two problems alike but all of them very interesting. I am still married to original wife. (When she got to be forty I didn't trade her in for a couple of twenties as is sometimes done.) I have a married daughter, Mrs. Glenn S. Lunger, living at Hughesville, Pa., and a son at home.

"There are a number of Technology men here in West Chester and vicinity but you can't prove it by the 'Register of Former Students' because the geographical register lists many at their office location. Clarence Clark with the Du Pont company is one of my neighbors; John Bleecker '98, field supervisor of the state unemployment service is here; also Bob Weeks '13 with the Du Pont company. Three, Bleecker, Weeks, and myself, of the twelve vestrymen of the Church of the Holy Trinity here are Tech men. Skardon '21 is here also. Bullens '09 is at Pottstown, but I have not seen him for a long time. His name appears on the membership list of the Pottstown Stamp Club, but I have never seen him at any of the meetings which I attend occasionally. Hence you can infer that my hobby is stamp collecting. I certainly would like to be able to attend one of the dinners you are planning and renew old acquaintances, but as I operate a one-man show, that is very difficult to accomplish."

Cookie tells me that '08 is doing a good job on the M.I.T. Alumni Fund. As of October 22, seventy-eight members or 21 per cent of the Class have contributed for a total of $661.14, or an average of $8.47. — The following changes of address have been received: Monroe Ames, 335 St. Louis Avenue, Ferguson, Mo.; Harry S. Chandler, 361 Metcalfe Avenue, Westmount, Montreal, P.Q., Canada; and Leavitt W. Thurlow, 1168 South Hue Street, Los Angeles, Calif. — Announcement has been received of the marriage of Frank Towle to Helen Louise Buss on October 13.

We report with regret the death of Eugene Clarence Howe which occurred on August 22 at Saratoga, Calif. Dr. Howe had been professor of hygiene and

1908 Continued

physical education at Wellesley College for twenty-seven years until his retirement a year ago.

The Boston *Transcript* of August 17 reported that Thomas Esten, son of Mr. and Mrs. Paul Esten of Stoughton, Mass., had been awarded the Croix de Guerre with special citations by the French Government at Vichy for bravery in action as an ambulance driver. He was cited because for three days and three nights, without rest, he helped carry wounded from the front lines to first-aid posts, frequently acting as stretcher-bearer himself. — Gregory M. Dexter reports the birth of a daughter on June 6. — Won't you drop us a line, even a postcard, to give us some news? — H. LESTON CARTER, *Secretary*, 60 Batterymarch Street, Boston, Mass.

1909

Carl Gram has recently heard from one of our faraway members, Ramon F. Munoz, who wanted "to be sure that The Review is sent to me . . . as I have always been interested in the Institute and its progress." Munoz is a mining geologist at Monterrey, N.L., Mexico, where he is engaged principally in consulting work and in the production of natural gas in Mexico. — Ben Pepper tells me that his older son, Edward, an Exeter graduate, is now a junior at M.I.T., and that the younger son attends Philips Exeter Academy. — Phil Chase is a member of the Visiting Committee for the Department of Electrical Engineering, and George Palmer a member of the Visiting Committee for the Department of Biology and Public Health.

Paul Wiswall sends me a letter from Larry Forrest which speaks for itself: "You fellows who were unable to join Commodore Ellis' August sailing party missed a swell time. With Dale as captain and yours truly as mate, crew, and sole passenger, we got the *Allenby* under way on Friday evening, after dinner at the Port Washington Yacht Club, and rounded the point into the Sound to find ourselves sailing into a drizzle which threatened to blow up into a real easterly.

"We spent the night in a near-by cove and resumed the trip the next morning. The highlights are the steak dinner on Saturday night after sailing into Oyster Bay in bright moonlight (Dale's galley was well stocked, as usual, with fluids as well as solids); the capacity one has for sleep out on the water, captain and crew vying in decibels and the latter winning hands down; the sail back on Sunday under what Dale called ideal sailing conditions, with racing sails all around us; Willkie's acceptance speech as read in the Sunday paper, reassuring to us both and raising our hopes; the crew walking the bowsprit stays to free the jib, and wondering whether certain insurance policies were about to become claims. All these were topped off with a fine dinner at the yacht club Sunday night and a very pleasant week end was closed. Dale is as delightful a host and companion as he is an efficient skipper, and I hope you will be on hand next summer when the call goes out for another '09 sail." — CHARLES R. MAIN, *Secretary*, 201 Devonshire Street, Boston, Mass. *Assistant Secretaries:* PAUL M. WISWALL, MAURICE R. SCHARFF, New York; GEORGE E. WALLIS, Chicago.

1910

Herbert Reynolds, formerly of Newton Highlands, Mass., is now with the Lamson Company, Inc., at Syracuse, N.Y. — Mr. and Mrs. Kenneth P. Armstrong of Washington, D.C., recently celebrated their twenty-fifth wedding anniversary. They have two sons, William and Howard, and two grandchildren. — In May, Raycroft Walsh, former member of the Hamilton Standard Propellers division, became vice-president and executive assistant to Eugene W. Wilson, who is now president of United Aircraft Corporation.

Your Secretary is indebted to Jack Babcock for the following excerpt taken from the Boston *Transcript* of October 8: "Information throwing light on Germany's falsification of radio reports has been received by the State Department from Colonel E. J. Ragsdale of Philadelphia, who declares that his daughter was falsely impersonated in a Berlin Broadcast. The Nazis pretended to have the young woman, Miss Natalie Ragsdale, in their broadcasting studio. They presented her to American listeners to testify to the ruthlessness of British bombing. She spoke, describing the bombing of a hospital in Berlin. Then the German speaker, 'Lord Haw Haw', said, 'American listeners must now believe, from the lips of an American young woman, what atrocities the British are committing.' The only trouble was that the Germans were too clever. Instead of inventing a name, they had actually picked a known American woman and pretended that she was speaking at the microphone. The broadcast was heard by an associate of Colonel Ragsdale in Philadelphia, who phoned him and asked, 'Is your daughter in Berlin?' 'Of course not,' replied Ragsdale, 'she is right here in the room with me.'" — HERBERT S. CLEVERDON, *Secretary*, 46 Cornhill, Boston, Mass.

1911

As announced in the November Review, Ted Van Tassel, X, is to be chairman of our thirty-year reunion, and he will announce his committee at the class dinner. There will be a general discussion of the affair, which you know is scheduled for the first week end in June, climaxing in Alumni Day at the Institute on Monday, June 9. As you accumulate 1941 calendars, be sure to circle those dates — June 6, 7, 8, and 9 — and best of all, plan to attend the reunion.

Those of us who were at the twenty-year reunion at Douglas Hill, Maine, remember so pleasantly Walter Welch's daughter, Margery, who accompanied her dad to the reunion. Well, sir, here's a fine story from the Port Chester, N.Y., *Item* of September 23: "In a simple ceremony, attended only by members of the immediate families, Miss Margery A. Welch, daughter of Mr. and Mrs. Walter P. Welch, Horton street, Rye, was wed Saturday afternoon in the Rye Presbyterian Church to Dr. Graham G. Hawks, son of Everett M. Hawks, New York City, and the late Mrs. Hawks. Rev. John D. Gregory, pastor, officiated and a reception for the families was given at the home of the bride's parents. The bride is a graduate of Skidmore College, class of 1937, and was graduated this month from the New York School of Nursing. Dr. Hawks was graduated from Colgate University in 1935 and from the New York University Medical School last June. He is now an interne in Brooklyn Hospital." — Walter, you know, is still a kingpin with the Combustion Engineering Company specializing in steam-generating and fuel-burning equipment, with offices at 200 Madison Avenue in the big town. He wrote that he hoped to stop sometime when en route to Boston and concluded: "Margery often recalls our attendance at the twenty-year reunion at Douglas Hill Inn and no doubt will check up at the proper time to assure my attendance at the thirty-year reunion next June."

Hal Robinson has been for a number of years and still is a member of the Worcester City Planning Board and recently, as secretary of the board, was active in arranging a dinner at Hotel Bancroft in cooperation with the state planning board at which Gordon Whitnall of Los Angeles, Calif., field consultant for the American Society of Planning Officials, was guest of honor. In the course of his speech, Mr. Whitnall stated that Worcester, a city of nearly 200,000 should most assuredly have a full-time city-planning expert, defining the latter as: "one who will give full time to the responsibility of learning from the city and its people what are the city's problems and discussing with the people what is to be done about them, his job being not to tell but to ask." In the discussion which followed, Robbie said the local planning board had been trying for years to convince the people that the city could more than save the salary of a full-time planning expert. "Until we have such a full-time man," he concluded, "I do not see how we can get very far. Members of the planning board have full-time businesses of their own. After we give time to study, we do not have the time to put a thing over or make the people see its value."

Oswald W. Stewart, I, manager of the inspection department, Associated Factory Mutual Fire Insurance Companies, Boston, proudly writes: "As a pleasant surprise to me, my second boy, Pearson, Amherst '40, has started graduate work at M.I.T., taking up regional or city planning. That is only the second of the four boys to go to the Institute, but it wouldn't hurt my feelings if some of the others followed." — Jack Herlihy, Ted Van Tassel and I had an informal meeting in Boston one afternoon in mid-October to talk over reunion matters and plans for the Seven Come Eleven dinner, and in the conversation it developed that Ted is now conducting an evening course at the Henry George School of Social Science (New York City) once a week in Newton, along with his regular duties.

1911 Continued

As for myself, I have taken on additionally the promotion of a talkie, "The American Way," for the community chest here in Worcester and from mid-September to mid-November I am seeing the family mostly at breakfast. I did manage to get away the last week end in September for my usual participation in the Freshman Camp of the Technology Christian Association at Dunstable, and again it was a grand affair. — As the thirty-year reunion approaches, that "write to Dennie" urge should begin to function. — ORVILLE B. DENISON, *Secretary*, Chamber of Commerce, Worcester, Mass. JOHN A. HERLIHY, *Assistant Secretary*, 588 Riverside Avenue, Medford, Mass.

1914

Charlie Fiske has made preliminary arrangements for a New York dinner to be held sometime early in the new year. Buck Dorrance and your Secretary are planning to attend. Any '14 men who get into New York from time to time and who would like to attend this dinner should drop a note to Charlie, and he will see that they are informed of the date and location. — Russell Trufant presented your Secretary with a cranberry-grower's calendar. This was really quite an affair, and it took several evenings to digest all the material it contained. There was a lot about yield per acre, dusting instructions, annual consumption, and many similar items that make one realize that cranberry growing is quite an engineering occupation after all.

Jerry Blakeley is another '14 man to be appointed to one of the Institute's Visiting Committees. Jerry is serving as one of the two alumni representatives on the Visiting Committee for the Division of Industrial Co-operation. — At a meet held at Northeastern University on October 23 Clarke Atwood, President of the Atlantic Research Associates, Inc., gave a very interesting paper on "Chemical Engineering and Patents." Clarke has made quite a study of this situation, and has been instrumental in developing several new processes, particularly those pertaining to the use of casein. — HAROLD B. RICHMOND, *Secretary*, General Radio Company, 30 State Street, Cambridge, Mass. CHARLES P. FISKE, *Assistant Secretary*, 1775 Broadway, New York, N.Y.

1915

Frank Scully has given me an old scrapbook containing the early class notes which he, Howard Thomas, and Bill Spencer used to write. It gives you a wistful feeling to read first of the men in their different jobs, then of the many marriages, and in due course of the many new babies. These same babies, now grown up, in turn are being married. — From Pittsburgh, Elbridge and Mrs. Casselman sent the announcement of the engagement of their daughter, Georgette, to John Charles Delo, Jr. — And then here in Boston on September 7, a group of us watched good old Weare Howlett walk proudly down the aisle with his daughter, Betty Jane, who was married to Allen Emerson Puckett in the Appleton Chapel in Harvard Yard. It was really a thrill to see an old classmate walk down the aisle with his daughter, whom we had watched grow up. — Soon these classmates who once were young and gay will be grandparents. In fact, I think Don Perin (he of the big 1915 sweater at the reunions) already has some grandchildren, and of course you know about Mary Plummer Rice's family.

An envelope addressed: "Mr. A. W. (help Azel) Mack" carried a delightful message from Mr. Wannop of the Oyster Harbors Club. Among other things he said: "I want to take this opportunity to tell you how much we enjoyed having you and your classmates here. Your committee deserves an unlimited amount of praise in the way it handled the reunion. Your members were very well behaved and gave us not the slightest bit of trouble. In fact, I believe the guests who were already here rather enjoyed being here during a reunion. Your reunion was one of the most successful we have ever had at the Club, and we are pleased that we all helped to make this outing an outstanding event in your lives. I know that Mr. Quirk got quite a kick out of your group, and he is still talking about the wonderful type of men that made up this reunion."

The praise is not limited to the management at Oyster Harbors Club alone, and I will give you excerpts from a few of the many letters I have received. For instance, Johnnie O'Brien's daughter Alice says: "As for the class party, I can hardly wait for 1965 and the fiftieth reunion to come around to see all the boys again. I hope you won't wait that long before inviting the families again." — From Ed Whiting in Narberth, Pa., "'Twas a swell reunion and the committee deserves much credit. Gene Place and I and our wives were out to see Herb Anderson, his goats, horses, ducks, turkeys, puppies, kids, and his new wife, and we all reunioned again." That is just the order Ed wrote so I don't know how to analyze the importance of the sequence. — From Alfred Hall, Saco, Maine: "We surely did have a wonderful time. One hundred per cent perfect, if you ask me, and your committee deserves a great deal of credit. It hardly seems possible that the event to which we had looked forward for so long is now nothing but a memory — but *what a memory!*"

Jimmie Franks, who told the funny stories in the bar, writes from Philadelphia: ". . . It was great to see all the boys again and I, for one, am not going to let so much time go by again without getting together with you all."

Charlie Williams, who strove so hard against bacchanalian temptations to maintain the dignity of his position as assistant to the commissioner of the Borough of Manhattan, says: ". . . I have some very good pictures of the shore dinner." — After Herb Anderson had apparently disentangled himself from the menagerie described in Ed Whiting's letter, he wrote: ". . . The general spirit of friendship that existed certainly is indicative of the manner in which the Class has held together over the years. Already I am looking forward to our thirtieth reunion. . . ." — Wallie Pike, in Boston, pens: ". . . As a member of the committee I cannot see that I did much work, but I thoroughly enjoyed myself. Reunions like this show how steadily the fine class spirit has been built up during the past years."

Otto Hilbert, who was right in the middle of the bald-headed group's picture, wrote from Corning, N.Y.: ". . . The reunion was an experience that will never be forgotten." — Carl Dunn, from Chicago, wrote: "I do not remember ever having had a better time and certainly resolve not to miss any future reunions. To those who missed this one — it was their great loss."

After many years of hibernating in Rumford, Maine, Ted Spear finally came to life with a bang. I was delighted to see Ted again, and I know many others must feel the same way. He says, "I can truthfully say that I can see now where I have missed a lot by not going back more often. . . ." — And from Frank Murphy in Boston, "Boy, oh, boy! What a reunion! Yours without argument . . ." — Bill McEwen wrote from North Main, Wellsville, N. Y.: ". . . It was a perfect party in every detail. . . ." — Phil Small, the long-distance prize winner from Cleveland whom we had not seen in years, was very much the life of the party at Oyster Harbors, and he wrote: ". . . I was lucky to attend the reunion, and to help you with a check. . . ."

Parry Keller, from Akron, Ohio, was another chap we had not seen for many years. He was impressed as his letter shows: "You should get real tough and charge the boys more for the reunion. Another suggestion is a series of rebates for contributions to the class notes. You might, incidentally, develop a literary genius or two and the Class might get a cut from their royalties. Your letters have sales appeal galore. I saw Herman Morse recently and we both agreed it was a successful reunion." — Little Andy, the sand hog, left for a motor trip for the coast, and George Rooney and I have had several cards from him and his wife en route. We suppose Andy is coming back to work on the new vehicular tunnel from the Battery to Brooklyn.

Ben Neal, Lockport, N.Y., says among many other things: "It was mighty fine to . . . know that you are still alive after the reunion. Just being a fellow of slight build, your advancing years and the strenuous work you put in to make the reunion party a success would appear to be a bad combination. . . . We are all very grateful to you for the outstanding enthusiasm, the number attending, and the pleasant memories." I am very fond of Ben but I don't like that crack about my advancing years. In his committee work Ben received an interesting letter from George Easter, 2434 South Avenue, Niagara Falls, N.Y.: ". . . I should like nothing better than to go along to swap lies and match capacity (liquid measure, not electricity) with the rest of the

1915 Continued

bunch. As I explained to you when I saw you in your office a few days ago, I'm buying two universities this year plus being tangled up in a patent suit next week, so all in all, I just can't do it this time. . . . Any personal data on me that is wanted — and I see no reason why it should be — you can supply from your memory or imagination, only don't give me more than one wife and four kids as that is all I want, need, or can afford, although I would not part with any one of the batch for anything I know.

"I think I told you that my hitchhiker son, on his way home from college last summer, picked up a ride with E. C. Walker of our old Course XIV, and found him still a nut on wireless. He sent along his card with the names of Allen Abrams of Wausau, Wis., Frank Hall, Greenleaf, Wilson, and Fred Buttner on it. . . . It would really be appreciated if any of the fellows who get into the neighborhood of Niagara Falls would find time to drop in and say hello as they go through. . . ."

Another of Ben's letters was from Bob Schmucker, 545 Union Street, Hudson, N.Y. He says: "Outside of my own Course III, the boys I remember best are those with whom I worked at the summer surveying camp in Maine — George Rooney, Frank Scully, and the other occupants of what was called murderers' row." That seems to bear out the general reputation that Course I has always had, but for once I think Course X did a job on them at the reunion. — Gil Peakes, of Metuchen, N.J., wrote that we could count on him for the thirtieth. Reunion notes would not be complete without a line from Speed Swift. "That was some reunion! There never will be a better one for us and as for other classes — they will have to do some tall shooting to better our mark." To Max Woythaler, who did such noble committee work, Speed wrote: "I have been doing a job on the nominating committee of the New Hampshire Republican committee for its convention this fall. There seems little doubt now but that I shall be in politics for two years more, for at the recent primaries I received the nomination for our legislature not only from the Republicans but also from the Democrats. Thus you see it is Swift vs. Swift and all the present betting favors Swift. Pretty soon now we should have the first showing of the consolidated movies of our reunion. I think that the fellows will enjoy seeing them." We may have a governor in this Class yet!

Despite the generosity of *the* Mr. Smith who made such a big reunion possible, the excellent quality we gave left a deficit which has been made up by the splendid and generous contributions of a number of classmates to whom I give my deepest thanks. An example of outstanding class loyalty is Orton Camp, of Waterbury, Conn., who wrote: "Sorry not to show up at the reunion. Things went wrong at the last minute, but I am glad to share part of the expense and am enclosing a check which I trust will square me." Orton, it more than squared you; it encircled you! — Last month I forgot to tell you that at Commencement Day exercises in Symphony Hall, Boston, on June 4, Marshall Dalton, George Rooney, and I in caps and gowns walked in the Commencement procession as representatives of the twenty-five-year Class. It was impressive to see all the available members of the fifty-year Class marching as a group and we have that to look forward to.

In a June issue of the *American Wool and Cotton Reporter* is an editorial on the appointment of George R. Urquhart, X, to the presidency of the Manville Jenckes Corporation in Manville, R.I. Unfortunately, George could not be at the reunion, but I have seen him since, and I must say the years have been very kind to him. He has a son at the Institute now. The editorial states that George has done a splendid job with his company. — Andy and Mrs. Wardle were visiting Boston from Chicago this summer and stopped at the Institute to see Barbara Thomas. Barbara says Andy is very busy working on the new Chicago subway.

In my work and traveling I have had many delightful meetings with classmates — in Detroit, a lunch with Loring Hall, in Buffalo, an evening with the Hiltons. I had planned to see Ben Neal and Ben Lapp, but the demands of the Hiltons and the limited time prevented this. In Albany I spent an evening with Charlie Blodgett, who was just about to accept a new position with the American Molasses Company in Brooklyn, N.Y. Good luck to you, Charlie! He has not changed much since his old wrestling days. — Ralph Hart and I had a delightful conference and lunch in Wilmington, Del., with Ken King. Ken, you know, is a boastful owner of the signatures of the ladies at the class cocktail party. — In Hartford, Conn., I had a reunion all over again with Don Perin, who can hardly wait for our thirtieth.

In New York I talked on the telephone with several of the boys and spent an evening with St. Elmo Piza, who is as charming and as droll as ever, and particularly entertaining with his English stories! — In Lawrence, Mass., I had lunch with John Dalton, who was going to entertain Lucius Bigelow and his wife the following week end. — Now it is possible that I have neglected to mention someone's letter or name someone I have seen, but you have a chance to correct me on this with a letter for the class notes and thereby "help Azel!" — AZEL W. MACK, *Secretary*, 40 St. Paul Street, Brookline, Mass.

1916

A recent letter from our Class Treasurer, Hovey Freeman, written just after he completed a flying trip to California, indicates that he would welcome suggestions for improving the condition of the class treasury in order to finance properly our forthcoming twenty-fifth reunion. Hovey left his home in Providence at suppertime, had breakfast in Los Angeles the following day, spent two days in that city, three days in San Francisco, one day in Seattle, one day in Chicago, and was back home in just a week's time. Classmates thinking of our reunion next June will do well to contemplate this mode of travel if they think they will be pressed for time. Your Secretary will be glad to pass along any suggestions for raising funds for the class treasury.

Our silver anniversary reunion will be held, in all probability, at a place much nearer to Boston than Saybrook, Conn., where we met for our twentieth reunion. The exact location has not yet been selected, and several appropriate spots are under consideration. The committee, which is already at work on plans for our biggest and best turnout, consists of the following, who met in New York City for an all-night session starting November 7 at dinnertime. Walter D. Binger, Thomas D'A. Brophy, James A. Burbank, Howard P. Claussen, Caruthers A. Coleman, Ralph A. Fletcher, Hovey T. Freeman, Charles W. Loomis, Irving B. McDaniel, Henry B. Shepard, and Robert E. Wilson.

On my excursions around the country during the last few years I have extracted promises from several classmates to attend the reunion. I am taking this means of notifying Ken Sully and Eddie Clarkson that they are expected to be on hand next June. Kem Dean will be leaving his cotton brokerage business, and Ralph Bennett will steal away from his job as general manager of the Mills Bennett Products Company at Houston, leaving the oil business to take care of itself for a few weeks, in accordance with a promise extracted at luncheon there some months ago.

Now if these classmates from such distant points are going to turn up in Boston next June, it behooves all of you from points in between to mark your calendars now to get on the band wagon. — Rumor has it that Clark Robinson, one of the country's foremost theatrical designers, is already at work on special '16 costumes for the class parade which will outdazzle anything that Ralph Adams Cram designed for the famous pageant of our graduating year. Seventy-two classmates were in attendance at the Riversea Inn at Fenwick in 1936. We should at least double this attendance for our twenty-fifth reunion near Boston next June. All suggestions, serious or otherwise, for the forthcoming event, will be welcomed by your Secretary, who will be glad to pass them along to the other members of the reunion committee. — JAMES A. BURBANK, *Secretary*, The Travelers Insurance Company, Hartford, Conn. STEVEN R. BERKE, *Assistant Secretary*, Coleman Brothers Corporation, 245 State Street, Boston, Mass.

1918

I told you a month ago that I hoped to get a story from our President for this issue and am glad to say that he came through with a very good one. I quote a paragraph from his letter: "Soon after we got back home a gangrenous appendix crept up on me with almost fatal results, but everything came out all right. The

1918 Continued

doctor poked around till he found a place that hurt. Annoyed, I said, 'Cut it out, doctor.' Sez he, 'I believe I will.'" Typical of Maggie.

Now to quote from his article from the *Troubadour:* "Sometimes there comes, even to the common man, opportunity to escape the commonplace and to lift the horizon as it were in an expedition which sees what there is on the other side of the mountains. It came to us last summer in the form of a bright and precious opportunity to drive across the continent. Such an experience unbuckles the mind and compels the readjustment of one's impressions. One comes home with a deep and abiding conviction that we have a handsomely rewarded possession in the character of our New England roads. To be sure we cannot expect — as they do in the West — to average 600 or 700 miles a day on a long drive. We cannot see a car coming five miles off. We cannot stand beside the road of a summer's night as I did at Panamint Springs, California, and see an automobile tail light until it disappears over a ridge a measured distance of 6¼ miles away. We cannot set the throttle at 50 miles an hour as I did on the road across the Amargosa Desert, Nevada, and drive for nine monotonous miles with legs crossed and hands never moving the wheel. Instead of uncrowded, treeless highways that do not wind, we have friendly branches that frame the skyline, and cover the sloping shoulders of those very same hills that cause our highways to hide their surprises around some beckoning curve. Those roads are things of priceless beauty after a trip across the great wide open spaces that are oh so great and oh so very, very wide. In the many level places one can often scan 400 square miles in one sweeping arc.

"There are high places too. The Laurel Ridge Pass across the Alleghenies (altitude 2,440 feet) is dull and prosy stuff indeed after the equally good pavement and the breath taking beauty of Trail Ridge Road, fingering the Colorado sky 12,183 feet above the sea. Here winter is never far from possession of the land. On June 22nd, cuts through the snow drifts were still eight feet deep. These two places are 2,000 miles apart. But the highest point in the United States and the lowest point in the Western Hemisphere are only 99 miles apart: Mt. Whitney, California, (14,490 feet) and Bad Water, Death Valley (280 feet below sea level). All save those who have been there, or those who have heard testimony of some convincing native, will greet with itching skepticism a statement that the climate of the area immediately surrounding Flagstaff, Arizona is not materially different from Vermont. But it is so. Who would believe that over half of all the fresh water acreage in the whole world is hemmed within the shores of our Great Lakes. That too is so.

"In New England, in the Rockies, and in the high Sierra, brooks are live and gurgling with pure water; elsewhere they are muddy. At the bottom of the Grand Canyon the Colorado River pursues its undiscouraged way to the sea, despite a burden of silt which is equivalent to the combined loads of seventy ten-ton trucks a minute — a million tons a day! It is 'too thick to drink and too thin to plow.' In Kansas there are snow storms of bugs to splatter macabre patterns on the windshield and to clog the radiator until your fevered cooling system gasps for air. Crossing the Great Salt Flats in Utah and Death Valley, California (July temperature 124°F) not one single insect will flatten his body against the glass. Would you be astonished to learn that the American Association of Architects rates the capitol of Lincoln, Nebraska, as the eighth most wonderful building in the world, ranking after such masterpieces as the Taj Mahal and the Cathedral at Rheims? Would you be amused to learn that a truck laden with cows, sheep, and hogs destined for the stock yard in St. Louis is carrying "bologna loads?" Could you understand the feelings of a woman watering three puny little trees every day and protecting them by a fence to keep the wild jackasses on the desert from eating the foliage? She went 'back to civilization' for a while but was quite unhappy until she once more found herself on the edge of Death Valley.

"What New Englander would believe that the drinking water for the people living at Woodside, Utah, is hauled 126 miles by truck, or that the dusty traveler would be welcomed at Downs, Kansas, by a home-made shower using 'Sun Warmed Water.' What a lather of excitement would come over the New Hampshire husbandman, with his dozen Dorset sheep, at seeing five separate flocks, 2,000 ewes to the flock, each with lamb, and all in one valley. This, just to the east of Salt Lake City. Just west one encounters the first series of signs. It reads, 'Two Stiffs Selling Gas. Lovelook, Nevada, 437 miles.' And sure enough two brothers — family name Stiff — do sell gas at Lovelook, Nevada, 437 miles away. For enchanting pageantry one might talk about the Diesel trucks, big as freight cars, that smash past; the 1940 outcome of the covered wagon. Or better still, the implausible spectacle of a stall on wheels trailing cross-country behind a cowboy's automobile and occupied by a saddled cow pony. The pony has a slightly hemmed-in feeling until he reaches town. There the auto and trailer are parked while the cowboy rides down the main street, once more gripping horse flesh between his knees in he-man fashion.

"In New England we have no natural wonder akin to the Grand Canyon where Mother Nature asks, 'Have you heard about my operation?' That operation, so the geologists tell us, discloses the handiwork of every geological period back to the Pre-Cambrian, or about a billion years ago. One is equally enthralled to realize that the ten-mile distance from the bottom to the north rim embraces climatic conditions and flora which range from the torrid zone at the bottom to temperate at the north rim. Somewhere along the rim we encountered a man from Ohio, despondently eating an orange. Taking a long shot, I said, 'Don't get discouraged, she'll be back.' Slowly looking up he replied 'It's a awful place to lose a woman in.' Would you be surprised to hear the Ford Sunday evening hour at 5:00 P.M. or Radio City Music Hall at 8:00 A.M.? One does in Yosemite Valley. One can also look up the sheer granite walls of El Capitan; walls that have resisted the slow, irresistible pressure of three separate glaciers, walls that rise 3,420 perpendicular feet above the Merced River which washes its base."

On his trip West Maggie addressed the American Society of Mechanical Engineers meeting at Milwaukee on "Selection of Men with Creative Ability." A. R. Mumford had no end of sport with him at his expense because he couldn't remember his name. It was printed on the program, too! Maggie also attended the Society for the Promotion of Engineering Education meeting at Berkeley, Calif., where he read a paper on "Teaching Industrial Relations." He was also supposed to speak at Salt Lake City to the Alumni but was ill and had doctor's orders to stay away. He says that since then he hasn't dared meet Charlie Locke '96. Let's hope by this time they have met and made up.

The report on the gift of the organ at our twenty-fifth reunion, as of October 1, stands: $681 pledged, which is just about one-half of what we need, and only $416 of the money pledged is paid to date. The list should be much longer than it is, and I do hope that the other members of the Class who have not returned their cards will do so quickly, so we may know what to look forward to. — Next month I must have news or there won't be any '18 notes in The Review. — GRETCHEN A. PALMER, *Secretary*, The Thomas School, The Wilson Road, Rowayton, Conn.

1919

The return from mailings during the past month has fallen down considerably. Your Secretary urges you to jot down some information about yourself on the cards which are mailed each month to various members of the Class. — B. H. Bristol merely writes in, "No change!" — Roderic L. Bent writes and gives the address of Alexander M. McMorran '21 as Nanaquaket Road, Tiverton, R.I. Rod is president and treasurer of S. Bent and Brothers, Inc., manufacturers of Colonial and school furniture. He has two sons who will enter M.I.T. in 1941 and 1943 respectively. — J. E. Cassidy writes that he has nothing of interest to report. He is patent attorney with the Bell Telephone Laboratories, studied law at Fordham whence he was graduated in 1935, and was admitted to the New York and United States patent bars. Cassidy is married, and has one son living in Great Neck, L.I. — Harry Cikins tells us that he is married and has three sons. He left the engineering field in 1931 and is now a life underwriter.

The Register of Former Students would like to have the present addresses of the following: Lewis J. Atwood, Jacob Braverman, Harold B. Butler, Victor Davidson, Henry C. Giles, Wilfred J.

1919 Continued

Long, and Arthur E. Wales. Your Secretary would appreciate information as to the whereabouts of any of these members of our Class. — Professor Kenneth S. M. Davidson has moved from Hoboken, N.J., to Mount Harmony Road, Bernardsville, N.J. — Dudley B. Murphy has moved from Los Angeles, Calif., to 1650 Amalfi Drive, Pacific Palisades, Calif. — Shao-Yu Hung may now be located care of China Chemical Works, 257 Honan Road, Shanghai, China. — Cho-Pin Hsueh is at Lane 91, 37 Edinburgh Road, Shanghai, China. — Yang-Mo Kuo's new address is Room 811, 113 Kiukiang Road, Shanghai, China. — Chen-Chi Pan may be reached care of Dah Tung Fong, Number 27 Route Prosper Paris, Shanghai, China. — Your Secretary has moved to 244 Palisade Avenue, Dobbs Ferry, N.Y. He would like to have any of the Class who pass through New York call him at Dobbs Ferry 2033 and visit him at the above address or at his place of business right next to Grand Central Station. — EUGENE R. SMOLEY, *Secretary*, The Lummus Company, 420 Lexington Avenue, New York, N.Y. GEORGE W. MCCREERY, *Assistant Secretary*, 131 Clarendon Street, Boston, Mass.

1921

Only a few months intervene before our reunion starting on June 6. An ideal spot has been selected about halfway between New York and Cambridge for geographical convenience to the maximum number of the Class in the East. Already volunteers have answered our appeal for contact men in various parts of the country. Wint Dean, XV, is rounding up the boys in the Twin Cities, and Ollie Bardes, XV, has signed up for the duration in Cinci. If you want to help make this a real event, please write to Ray St. Laurent now that you are phoning the fellows in your neighborhood, and that you will make up a party for the tremendous twentieth reunion next June.

Hugh E. McKinstry, XII, has left New York, according to a note from Charlie Locke '96. Hugh is now acting professor of geology at the University of Wisconsin, Madison, Wis. — On October 15, Ralph Wetsten, VI-A, was toastmaster at a regional meeting of twenty-five members of the M.I.T. Club of Northern New Jersey who reside in Summit, Chatham, and Short Hills. Ralph is engineer of distribution with Public Service Electric and Gas Company and New Jersey's outstanding proponent of the Hammond electric music box. Also present were Maxwell K. Burckett, VI, Vice-President of the Club, John W. Rockefeller, Jr., IX-B, and your Assistant Secretary. Max is production control manager of Vick Chemical Company in New York, and Johnny is also in New York, where he has his own consulting engineering offices. — Your Secretary enjoyed a visit with Ray and Helen St. Laurent on one of Ray's trips to New York to further reunion plans and, incidentally, to attend to the interests of Rogers Paper Manufacturing Company. Chick and Frieda Kurth had time only for a phone call during a recess in Gotham from representing the Class on the Alumni Council and supervising the Boston Edison distribution system.

It is with sorrow that we record the death on July 6 of Charles Albaugh Cassell, III, at his home, 5303 Kimbark Avenue, Chicago, Ill. Charlie was born on February 16, 1899, at Westminster, Md., and prepared for the Institute at Baltimore Polytechnic Institute, joining us in our sophomore year. He was a member of Phi Kappa Sigma and active in the Mining Engineering Society. Our sincerest sympathy is extended to his family on behalf of the Class.

Howard L. Vickery, XIII-A, a commander in the United States Navy and a resident of Brookline, Mass., was recently made a member of the United States Maritime Commission. Commander Vickery has been assistant to the chief of the United States Navy Bureau of Construction and Repair for a number of years. A native of Ohio, he entered the construction corps from that state in 1918 and subsequently completed courses at the Army Industrial College and the Naval Construction Course at Technology. He was promoted from lieutenant commander to his present rank in 1935. Major is the new title which Joe H. Carr, IV, has achieved in the United States Army Air Corps. He is located at Mitchel Field, Hempstead, L.I., N.Y.

The Register of Former Students has asked for the location of the following men for whom mail has been returned from the addresses given: Fred C. Crocker, II, 60A Dracut Street, Dorchester, Mass.; Edwin Levy, X, 3743 Tracy Street, Kansas City, Mo.; Ali Shriro, I, 932 Carroll Street, Brooklyn, N.Y. Will anyone knowing their whereabouts please drop a card to the Register of Former Students at M.I.T. — The changes of address recorded for the past month include: John S. Cummings, VI, 115 Barnard Avenue, Watertown, Mass.; Elmer W. Davis, II, 78 Hollywood Avenue, Rochester, N.Y.; Herbert A. Kaufmann, X, 1056 Grant Avenue, Pelham Manor, N.Y.; James S. Parsons, XV, 2 Green Hill Road, Madison, N.J.; Sik Setoo, II, Lane 579, 23 Yu Yuen Road, Shanghai, China; Harold F. Stose, XIV, X-A, 1526 Parkside Boulevard, Toledo, Ohio; Charles A. Williams, VI, 30 Rogers Road, Hamden, Conn.

When next we meet another calendar year will have been completed. May we wish you and yours a Merry Christmas and a Happy New Year. Won't you extend your mailing list to include a brief note to your Secretaries. — RAYMOND A. ST. LAURENT, *Secretary*, Rogers Paper Manufacturing Company, Manchester, Conn. CAROLE A. CLARKE, *Assistant Secretary*, 215 Linden Avenue, Glen Ridge, N.J.

1922

Our twentieth reunion is becoming a topic of discussion, and there is no law yet to prevent us from beginning to make plans for that illustrious event. — Do not forget the New York class dinner on Monday, December 2, at the Technology Club, 24 East 39th Street, New York, N.Y. — Yard Chittick has been getting around the country and saw Dexter Shaw in Philadelphia at a meeting of the American Bar Association. Shaw is now a partner in the patent law firm of Howson and Howson and was on the local committee of the Philadelphia Patent Bar Association in arranging for some of the meetings.

Arthur L. Pitman, X-A, writes that he is living at 1476 Scenic Avenue, Berkeley, Calif. He is in the chemical engineering and development division of the Western Regional Research Laboratory now nearing completion at Albany, Calif. This is one of four new laboratories in the Bureau of Chemistry and Engineering of the United States Department of Agriculture. Pitman was transferred from Washington, D.C., where he was in the same bureau. So far he has met only one M.I.T. graduate, the well-known Merle Randall '12, professor of chemistry at the University of California, but he expects to meet others this fall. The Secretary extends his thanks to Pitman and wishes that other members of the far-flung Class would write.

Yard Chittick received the following letter from Ram Prasad, superintendent of the Power and Light Company, Champion Reefs, India: ". . . I keep in touch with the activities of M.I.T. and of the Alumni and hope to renew old contacts one of these days. I am now in charge of a high-tension transformer station of 26,000 kilowatts, supplying power to a gold mining company. Our equipment both at the power station and the mines is up to date in design, and this place is one of the best mining areas I have seen. Best wishes for M.I.T. '22." — The Class hereby returns best wishes to classmate Prasad and reminds him that the next reunion is less than two years away.

The wedding of James L. Guardo, II, to Anna Kathleen Devaney was announced on September 25. Dr. and Mrs. Guardo will reside at 480 Main Street, Stoneham, Mass., where Dr. Guardo conducts his medical practice. — The Dartmouth Printing Company announced the appointment of George T. Bailey as superintendent. Bailey was formerly assistant printer to Yale University, and manager of the printing office of the Yale University Press. — CLAYTON D. GROVER, *Secretary*, Whitehead Metal Products Company, Inc., 303 West Tenth Street, New York, N.Y. C. YARDLEY CHITTICK, *Assistant Secretary*, 77 Franklin Street, Boston, Mass.

1923

Jack Keck reports he is still in process of recovery from his last winter's accident and struggling with the added problem of his deafness. He loyally furnishes the following notes: "Miles Pennypacker is President of the M.I.T. Club of Northern New Jersey this year and is doing a good job in spite of the 155.3 per cent activity of his own business, Voltarc Tubes, Inc., Newark. I think I told you about Charlie Roche, who is with Merck and Company in Rahway. In the early summer another

1923 Continued

candidate for the Class of 1963 was added to the Roche family — a fine boy, so that Charlie now has three boys and a girl.

Ed Thimme was married to a Jersey girl on Saturday, October 12, and went to Sea Island, Ga., for his honeymoon. — Shorty Chamberlin works for the White Construction Company, and has just completed a job for Johnson and Johnson at New Brunswick. He went to Northfield, Minn., for a couple of weeks' vacation. — Jack also reports his new address which appears at the end of these notes.

Per K. Frolich is in the technical news again. Under the heading "'Butyl' — An Ace In The Rubber Race," *Financial World* says the following: "Rubber is a combination of hydrogen and carbon. So is petroleum. Nature juggles atoms to make rubber in one case, petroleum in the other. There lies the answer to why companies like Standard Oil of New Jersey and Phillips Petroleum are interested in synthetic rubber. Early this year, 'Jersey' announced that it had received a license to produce Buna, Germany's now-famous laboratory rubber. Last June, coincident with Goodrich's public presentation of Ameripol, the big oil company first told stockholders about its butyl rubber. Comparatively little was said about it at that time, however — a situation that was changed last week when Dr. Per K. Frolich, director of the chemical division of Esso Laboratories, presented the first technical report on the new product before a national meeting of the American Chemical Society in Detroit.

"Butyl, it was explained, represents ten years of independent effort by the Standard Oil research organization and is now being produced in a semi-commercial pilot plant. Although it involves the most advanced technology, it is made from petroleum by processes more direct and simple than those required for the production of Buna. Distinctive characteristics include greater ability to stretch than natural rubber; amazing resistance to mineral acids; remarkable stability and durability; freedom from impurity, taste and odor; lack of color; good age, tear and abrasion resistance; and unusual electrical properties. Since it is not oil-resistant, it will not be in direct competition with Buna for most of the specialty markets.

"According to chemists of the Standard Oil Development Company, the fundamental chemical difference between natural and butyl rubber — and the key to its unique properties — is that the natural rubber molecule is highly unsaturated, while the butyl rubber molecule is unsaturated just enough to allow it to be vulcanized, and no more. This is a radical departure in rubber technology and makes butyl superior for many purposes to natural rubber and other synthetics.

"It is interesting to note that, in years gone by, research activity was directed toward reproducing natural rubber's qualities as near as possible. Now, however, the tendency is to synthesize materials closely resembling the natural product in some respects, while, at the same time surpassing it in others. Thus, aside from helping to free us from dependence on far-off supplies of crude rubber, development of butyl may be looked upon as another step toward giving American industry a whole range of man-made rubbers which, in sum total, will do everything Nature's product can do — and more."

The Miami, Fla., daily *News* recently devoted the best part of a page to the activities of the training program of the National Youth Administration of which C.P. Thayer, Secretary of the Technology Club of South Florida, is area supervisor. Thayer has charge of some 300 N.Y.A. trainees. Through its training program the N.Y.A. is one of the agencies assisting in the frantic effort to fill the need for trained men in industries essential to national defense. Some 127 youths are receiving special training in airplane-motor and fuselage construction, woodwork, sheet-metalwork and automobile motor overhauling. — Supplementing what was previously reported I have received a card saying: "Crossett Watzek Gates Industries announce the appointment of Lt. Col. William E. R. Covell as general manager of their Crossett, Arkansas, companies: Crossett Lumber Co., Crossett Mercantile Co., Crossett Paper Mills, Crossett Chemical Co., Public Utilities Co. of Crossett, Crossett Timber and Development Co., Inc., Ashley, Drew and Northern Railway Co., August 6, 1940."

Recent address changes reported to the Alumni Office show the following: Ray Holden, from St. Louis to International Shoe Company, Manchester, N.H.; Jacob A. Elfenbein to the Aircraft Training School at Santa Monica, Calif.; Harold G. Crowley, Air Safety Board of Civil Aeronautics Authority, Chicago; Ivan L. Tyler to Pennsylvania Turnpike Commission, Harrisburg; and Lt. Julian S. Loewus, United States Coast Guard Depot, Staten Island. — HORATIO L. BOND, *Secretary*, 457 Washington Street, Braintree, Mass. JOHN M. KECK, *Assistant Secretary*, 207 Bloomfield Avenue, Bloomfield, N.J.

1924

Si Simonds, world traveler and chief engineer of the Dollar liner *President Coolidge*, stopped in to see the Secretary during a summer vacation ashore. A frequent visitor to Shanghai, Si reported that Hsueh and Hsu, which sound alike, are both in that city, the former making silk machinery with which the latter makes silk. In Chunking is Chu '26, now a general in the Chinese Army, Minister of Intelligence and Propaganda, and the "authorized spokesman" often quoted in press dispatches. Jimmie Wong, Si reports, is marine superintendent for the Blue Funnel line in Hong Kong, and is now building twenty-five large ships. In Burma, Si meets Joe Young and his brother Joe Ting, Joe apparently being the family name. Homeward bound, Si occasionally sees Bill Hitchcock, who sells securities in Honolulu.

Heralded as an event of vast importance to national defense is the Tennessee Valley Authority announcement that John Henry Walthall of its engineering staff has produced alumina from common clay found in many parts of the United States. The class salutes Walthall on his discovery. — President Compton's annual report discloses that Ed Taylor of the Institute's Department of Aeronautical Engineering has been made chief assistant to George Mead '16, who heads airplane-engine production for the Knudsen committee.

Chick Kane, in his new capacity as director of the Alumni Fund, proves to be a good source of news. Here is a recent letter from him: "One of our classmates came into the office . . . and, although you won't remember him any better than I did, he will still make good copy for your next class notes. Leon G. Rucquoi did most of his work in 1923 but is affiliated with our Class. He came from Belgium and after graduation returned there, where he has been in the steel business ever since. He married an American girl and they have three children. Last year he was sent to this country on a mission and after some deliberation decided to bring his family with him. Before he returned he thought it might be smart to leave them, so he went back alone. He was in Belgium all during the unpleasantness, and on July 27 he got out of France with his brother — a captain in the Belgian Air Force — and came to this country. They have both taken out first papers and have nothing too good to say about America — nothing too bad about Europe. Right now they are both job hunting.

"Then I think I told you about Dolph Santos, but just to keep it straight for the record, Dolph has been with the São Paulo Tramway Light and Power Company, Ltd., ever since graduation (in case your geography does not extend beyond the New England Telephone and Telegraph system, São Paulo is in Brazil). Dolph, a Course I man, is construction engineer on a very interesting hydroelectric project under Ken Billings' father. Ken's father is vice-president in charge of construction. The job was something new and novel in that they built relatively low earth dams forty or fifty feet high and backed the water up to spill over the edge of a 2,400-foot plateau — the first time in history that this has ever been done.

"For some time Dolph has been on weather-forecasting work and has been co-operating with Cal Tech on experiments in long-range predictions. One outstanding point in his career was a very violent entry into local politics. In 1932 he joined a revolution in São Paulo against the two-year old Vargas dictatorship and spent three months in jail! He says he lost all interest in politics as a result. — Les Leighton dropped in a few weeks ago with his son — just making a vacation trip." — FRANCIS A. BARRETT, *General Secretary*, 50 Oliver Street, Boston, Mass.

1926

As the address change slips come through, we begin to see the effects of the present emergency operations on the

1926 Continued

Class. We note, for example, that Maurice L. Ash, Jr., is at the headquarters of the Detroit Ordnance District, that Whitney Ashbridge now carries the rank of major and lives at the Army and Navy Club in Washington, and that William R. Franklin is now a lieutenant and his address is Newport, R.I.

Some of the foreign addresses also reveal interesting occupations. S. M. Chu, who was in Course II, now has as his address: Minister of Intelligence and Propaganda, Chinese Republic, Chungking, China. Colin W. Reith, who was in the Bahrein Islands, Persian Gulf, is now back in New York under the aegis of the California Texas Oil Company. L. C. Chin is now working in Kunming, the capital city of Yunnan Province, China. He is manager of the Electric Power Company.

Among recent visitors to the Institute were Sam Cole of White Plains, and William M. Davidson, who is now with the Bell Telephone Company of Pennsylvania with headquarters at Philadelphia, having recently moved from Wilkes-Barre. — Alec Fisher of the General Electric Company was the author of the recent article on the new Amplidyne which was published in the *General Electric Review*. — Eben Haskell has moved to 215 Hartford Turnpike, Hamden, Conn. — There are obvious stirrings in this august Class in anticipation of the fifteenth reunion scheduled for next June. Have you got it on your calendar? — JAMES R. KILLIAN, JR., *General Secretary*, Room 3-208, M.I.T., Cambridge, Mass.

1927

Can you imagine how easy it is this time to just reach into the drawer and pull out a whole handful of notes, all because some of you fellows have crashed through and really given some information about yourselves, via my questionnaire of September 16? Unfortunately, however, the supply will run out before very long if more of you men don't get on your horses and send in some news. — Glenn Jackson still resides in Pawtucket, R.I., from which point he operates for the United States Finishing Company. Glenn's work concerns sales engineering and the development of spun-rayon fabrics and finishes. He is contact man between the New York sales and the two Connecticut factories. Glenn's two sons apparently have been giving him a workout. This is Glenn talking: "Two sons, whose questions often make you think more than Professor Schells' administration problems, prove to me that the most obvious things are accepted by us too readily. They'll question and find angles in a block of wood that we'd never see. Result — their knowledge widens. If we could continue with their zest for knowledge throughout our whole existence, I'm sure we would all be Thomas Edisons." We expect that Glenn will be with us at one of the New York meetings.

Having lived in many places over the past several years, Eugene Geisel is presently located at Allentown, Pa., where he is working on an appraisal of the Pennsylvania Power and Light Company. He is doing this for Jackson and Moreland of Boston. Gene has two girls, aged ten and eight years. — Late this summer, in a blind rush to get to the office via the Grand Central Station, your Secretary spied Lee McCanne, who had just arrived on an early morning train from Rochester. After considerable detective work he found that Lee is secretary and assistant general manager as well as director of the Stromberg-Carlson Television Manufacturing Company of Rochester. Up until February of this year he had been radio sales manager and at that time was promoted. Even though I have not seen Lee since graduation, I can report no apparent difference. Time apparently intends to spare him well. I think his hairline is where it was thirteen years ago.

A clipping from the New York *Herald Tribune* tells of the marriage of Juliette Breault to Doria Letourneau in New York on August 31. — Through the courtesy of F. L. Foster'25 of the Institute we learn that Hank Barlow is living on a 175 acre farm near Califon, N.J., which is just about forty-five miles from New York City as the crow flies. He has gone into farming in an intensive and apparently scientific manner. Although the farm was quite run down when he undertook his present endeavors, with the help of several employees he is now running the farm on a production line basis. His work to date has been of sufficient interest to attract the attention of members of the staff of the New Jersey Agricultural Experimental Station and they are co-operating with him in a number of details. A generous invitation is given indirectly to any and all of the Class to pay him a visit.

Fred Reynolds is connected with the auditing and accounting control department of Massachusetts. From his description it would seem that he is concerned with the efficient design and performance of the many details of such a large operation. Fred says: "I have recently signed up with the signal corps of the state guard, which is being formed to take over the duties of the national guard after their induction into Federal service." — Ben Wood is living in Harrington Park, N.J., where he is works manager for Spencer Kellogg and Sons. The plant manufactures and refines linseed, coconut, Perilla, cottonseed, and Chinawood oils. Ben reports that the only classmate he has seen in years is Bob Engel, who "is a sweet smeller with Givaudan-Delawanna, Inc., New York." — Merry Xmas and the most prosperous of years in 1941 for all '27 men. — RAYMOND F. HIBBERT, *General Secretary*, care of Johns-Manville Corporation, 22 East 40th Street, New York, N.Y. DWIGHT C. ARNOLD, *Assistant Secretary*, Arnold-Copeland Company, Inc., 222 Summer Street, Boston, Mass.

1930

The George Wymans are proud parents of a future managing editor of "Technique" in the person of George Mead Wyman, born on September 27. — The engagement of Sally Scates of West Medford, Mass., to Bob Phelan was recently announced, and when these notes are read, the wedding will have taken place. — Our congratulations and best wishes to both the Wymans and the Phelans!

Many of you are probably wondering how much longer the dividends from your class endowment insurance policies will be paid to the Institute. The dividend accumulations will reach $100 a man in 1943, several years later than it was estimated in 1930 when you signed up. Of the 161 policies issued shortly before graduation, there remain in force 122, and by the time of our twenty-five-year reunion the Class Endowment Fund should amount to about $22,000. — While on the subject of finances I wish to put in a word or two for the newly established Alumni Fund. Phil Holt is doing a great job in his role as Class Agent for the Fund and deserves the backing of us all. Our Class didn't exactly cover itself with glory in the campaign for the new recreational facilities several years ago. Many felt unable to contribute then, but may be in a better position to do so now. Let's put 1930 on the top! — PARKER H. STARRATT, *General Secretary*, 1 Bradley Park Drive, Hingham, Mass.

1932

After last month's belated note about Curt Cummings' engagement, we received a clipping about his marriage to Helen Higbee on September 7 in Cambridge. After a cruise to Havana, they will live in Belmont. — George Hoadley, former instructor in Electrical Engineering at M.I.T., has gone to Brooklyn Polytechnic Institute as assistant professor in electrical engineering.

F. Rolf Morral who is in Kokomo, Ind., has written three technical papers, the first in conjunction with E. P. Miller and the second and third with J. L. Bray'12. They are: "X-ray Analysis of Hot-Galvanized Heat-treated Coatings," "Addition Agents and the Electro Deposition of Zinc," and "Zinc Coating-Unit Operations, Costs and Properties." Morral is not only teaching metallurgy, but is also giving Spanish three nights a week at Kokomo Junior College.

From the notices of address changes received we learn that Ben Archambault is with the Vick Chemical Company, New York City. Wendell Bearce is with Aroostook Trap Rock Company, Presque Isle, Maine. Rolf Eliassen is in the sanitary engineering department, New York University, University Heights, N.Y. Joe Ivaska has moved from Plainfield, N.J., to 1038 Chase Parkway, Waterbury, Conn. James Ritchey is with Schlumberger Well Surveying Corporation, Corpus Christi, Texas. — CLARENCE M. CHASE, JR., *General Secretary*, 1207 West 7th Street, Plainfield, N.J. CARROLL L. WILSON, *Assistant Secretary*, Research Corporation, 137 Newbury Street, Boston, Mass.

1933

We are very grateful to Ed Atkinson for keeping up to date with Course V. He sent the following: "During the past

1933 Continued

year a few items of interest have come to the attention of your correspondent, although it is admitted that many of them did not penetrate to the wilds of Durham [Ed is in the Department of Chemistry and Chemical Engineering, University of New Hampshire, Durham, N.H.], but were gathered during my wanderings. First of all, definite proof has been obtained to bolster the hypothesis that our Course Secretary is still alive; it takes the form of an item in The Review telling of his marriage a year ago to Miss Watson in Charleston where Ed Hillenbrand labors. We now pass to information on the recent acquisition of a paternal status by Peter Parker (Peter Jr., May 27) and George Garcelon (Gail Louise, September 14). My wife and I spent a night with the Garcelons last March while we were en route to Cincinnati. George still has to take a bath every night at five in order to remove the coating of his recently developed Superlitefast dyes. Permanganate takes the place of soap. George and his progeny now reside just outside of Reading at 42 Spring Crest Boulevard, Sinking Springs, Pa. — Bob Heggie is out to take globe-trotter's honors from Peter Parker; this year he left New York for the wilds of Ceylon and is still there as far as I know. Whether he took his wife with him or not I can't say.

"With the exception of changes noted above, addresses and business connections remain as recorded in The Review last December. Bill Adams is still taking his girl friend on hot-dog roasts at Rye; Irv Crane is still taking milk out of babies' mouths for conversion to artificial wool. I spent the summer teaching and moving from a two-room apartment to a six-room house; I also took in the American Chemical Society meeting in Detroit. . . . I detected a person bearing a close resemblance to Joe DiMaggio one evening. The Yanks lost to the Tigers the next day. When I saw Abner Crump Hopkins at Cincinnati last April he claimed to have seen about every member of the Class within the past year, in addition to a miscellany of other products of the chemistry department. Hoppy is some sort of salesman for the General Chemical Company, and does he get around!" Thanks again, Ed.

From the *Alumni News Letter* of Nu Delta chapter, Phi Mu Delta Fraternity, we learn that Joe Carbonell sends his regards to all the boys and that Don Fink was the chairman on arrangements for the conclave held recently at the Nu Eta chapter house at Kingston, R.I., and is at present the managing editor of *Electronics;* Art Hungerford is in charge of the motion picture section of the television program of the National Broadcasting Company in New York City; and Andrew F. Rankin is directing the employment department of Eastern Nazarene College and working for his M.A. at Boston University.

We have learned too of the marriage of Mary Dorothy Hatch of Waltham, Mass., to Robert B. Grady, X; and of the engagement of Raymond O. Burzynski, XIII-A, and Carolyn C. Smith of Portsmouth, N.H.; Kirtland Manley, IV, and Marie Anne Vassar of Rutland, Vt.; George P. Bentley, XVI, and Alice P. Sidebottom of Milton, Mass.; and M. George Green, V, and Beatrice T. Gould of Malden, Mass. — And here are my greetings to you all for a *Merry Christmas* and a *Prosperous New Year.* — GEORGE HENNING, JR., *General Secretary*, Belmont Smelting and Refining Works, Inc., 330 Belmont Avenue, Brooklyn, N.Y. ROBERT M. KIMBALL, *Assistant Secretary*, Room 3-104, M.I.T. Cambridge, Mass.

1935

The class news went into a slump this month, but we have a few items to report. Zay Curtis finally slipped on one of those banana peels that the girls put out for the fellows. The winner is Elizabeth B. Davis of Pelham, N.Y. Zay is working for the Brewster Aeronautical Corporation in Long Island City.

Jim Monagle has left the Waltham Watch Company and is now working for Hanson-VanWinkle-Munning Company in Matawan, N.J. — Jim Eng has left Halcomb Steel Company on a year's leave of absence in order to serve as a first lieutenant at the General Headquarters Air Force, Ordnance Department, Langley Field, Va. — Paul Gilmont, who was unemployed, has also gone on active duty with the Ordnance Department at Edgewood Arsenal, Md. — Tzeng Jiueq Suen is working at the Vegetable Oil Cracking Plant in Chungking, China, as a research chemist. — ROBERT J. GRANBERG, *General Secretary*, care of W. C. Voss, 9 Old Town Road, Wellesley Farms, Mass. RICHARD LAWRENCE, *Assistant Secretary*, 111 Waban Hill Road North, Chestnut Hill, Mass.

1938

The bachelor ranks of the Class are becoming increasingly riddled. Married way back last May was Al Bates, XIII, to Louise Welch of Coraopolis, Pa. Al is still with Dravo and reports that both the job and married life are agreeing with him. He's back designing river boats after a few months in the welding department. — Married in September were: Harry Draper, XV, to Elizabeth Chalifoux at Beverly Farms, Mass.; Earle Lovering, XIX, to Geraldine Chase at Limestone, Maine; and Meridith Wardle, XI, to Letitia Stimpson at Miami, Fla. Incidentally, Wardle is now with Curtiss-Wright in Buffalo, N.Y. — As forecast in the June issue, Ed Bossange, XV, was married in August to Evelyn Arnold at San Francisco, Calif.

On October 5 Gordan Foote, V, was married to Esther McCall at Greenwich, Conn. Your Assistant Secretary, Lloyd Bergeson, and Colonel Harris '37 were ushers, and not a few other Fijis were there, including Robbie Johnson, Doug Esperson, Sam Steere, John Cook, and Bob Youngquist '39. Needless to say things were humming in Greenwich for a couple of days. Incidentally, Gordan finished his doctor's thesis in October, and by the time this is published he'll be with Procter and Gamble in Cincinnati.

We hear of the engagement of Dick West to Betty Lingle of Evanston, Ill.; Al Minott to Dorothea Shrader of Melrose, Mass.; Rudy Vogel to Anita Steiber of Bridgeport, Conn.; and Art Gould to Anne Pallister of Dorchester, Mass. Art is at the Springfield Arsenal presumably making automatic rifles. Tony Smith writes that Howie Banzett was married in September to Edna Anderson of Bergenfield, N.J. Frank Atwater was best man and Giff Griffin and Tony were ushers. Tony says that Giff was so impressed that he got married the next week end to Jeanne Graham of South Orange, N.J. Frank and Tony, however, are still single and able to find time for other activities, such as color pictures for Frank and Course I newsletters for Tony — a sample of which follows: "We left Nick Barbarossa heading for Newport, R.I., as an engineer with the coast guard. After two months there he returned to Providence till June, still with the coast guard. In the summer he and Glacken took a ten-week course in aeronautical engineering at Technology sponsored by the government. On September 4 he was to begin as an instructor in civil engineering at Manhattan College. Subjects include primarily hydraulics and fluid mechanics and mean that he is in charge of the hydraulics lab.

"Russ Brown's letter of February tells of sunburns and so forth in southern Florida. At that time he was with the Geological Survey on ground-water work. They are keeping track of fluctuations in wells to determine ultimately the direction of movement of ground water, to discover where salt is contaminating the supply, to suggest means of halting this contamination, and finally to ascertain the amount of water available. I sent a card to him for latest news, and received an invitation to his wedding, much to my surprise. He was married at Trinity Church in Boston on September 13 to Grace E. Johnson. Congratulations!

"King Coombs left the New Haven sewer job on December 2, being transferred to the home office in Red Bank, N.J., doing estimating work. Next I heard that he was in Baltimore on a contract for the city — 'yes, another disposal plant.' He arrived in the middle of May and expected to be through shortly. — Soon after the last letter went out, I got a card from Bernard Elkin '39 mailed in Cristobal, Canal Zone. He said he was down there bidding on the superstructure for some barracks. A card later was mailed from Springfield, Mass., where his company was putting up barracks. They must be busy in that line nowadays.

The last letter brought forth gobs of data from Jim Emery. At that time he was still with the American Transit Association with whom he's been since July, 1938. The A.T.A. is a voluntary association of city streetcar, bus, and trolley bus operating companies, and manufacturing companies that make said equipment. They act as an information clearinghouse on transit operations and assist in solving problems of operation, maintenance of equipment, and the like. Jim started as

1938 Continued

an assistant in an accident-research program with the objective of laying out standardized methods of accident analysis. In July, 1939, he was moved to the position of assistant to the engineering secretary. He arranges discussion meetings for men operating in different parts of the country, follows the work of special committees, edits their reports for publication, and answers company questions. He, like Mike Forman, is a commuter, and had no ties of a female sort at that time.

"Johnnie Glacken took the aeronautical engineering course at school this past summer. A card from Ed Martin confirms what John was hoping for, namely, a job with Lockheed in Burbank, Calif., where he started work on October 1. In March his letter spoke of introducing us to 'a daughter of California.' What goes on here? — In March, Fred Klauck was still with the soils laboratory of the United States Engineers in Ithaca, N.Y. He was working on design analysis of various flood-control works in southern New York and testing samples sent from the Washington National Airport.

"Ed Martin says he is still in Denver with the Bureau of Reclamation, I presume as junior engineer in the design studies section. He also said he would be in a rut "if it were any other place but Denver." Ed reports Enver left the bureau for a sewage equipment supply outfit in Milwaukee. Ed also reports (don't know that we would do without him) that Paul O'Connell left the bureau to start work on September 1 as a junior engineer with the Navy Department at Charlestown, Mass. In Paul's letter of February he said he was in the soils laboratory running specific gravity and hydrometer tests in particular. — Gus Rossano says he spent two weeks at Fort Du Pont, Del., in active duty, and the rest of the summer in Great Neck, Long Island. He finished one year at the University of Illinois and accepted a scholarship this year at the Harvard Graduate School, where he is to get his M.S. in June. Looks like he has been sold up the river. — Through the grapevine I hear that Jim Surprenant is working with Merrit, Chapman, and Scott on the Quonset Naval Base at Quonset, R.I. Let's hear the details. — Curt Torrance has been working with the Hartford Engineering Department on their flood-protection program. This program entails a four-way revision of the old sewage system: (1) to handle normal flow with the Connecticut River down, (2) normal flow, river up, (3) storm flow, river down, (4) storm flow, river up. He's been on the design end of it. On October 9 he came here to help us in this office of Stone and Webster to handle all the work we have — eight million dollars' worth.

"As for myself [Tony] I've been getting good experience in various fields with Stone and Webster. Last spring three of us were borrowed by the Virginia Electric and Power Company to help prepare countless tables and charts for a Securities Exchange Commission investigation of V. E. and P.'s holding company. In the early summer I was put on a structural inventory of the plant here for the Federal Power Commission. It's a dated inventory and means preparing a picture of the amounts of material in the plant at any given year from 1900. Checking and changing old prints, making sketches, and asking questions of old-timers make up most of the work. I've had two or three Virginia Polytechnic Institute boys (class of '40) helping me, and they have been keeping me stepping. I hope to get out in the field on the new work, a sixty-mile transmission line and a new turbo-generator at Norfolk. In spite of the various government agencies that indirectly employ me, I'm a Willkie worker in this solid south."

Little other news has seeped in since spring, although Boston was recently honored by a visit from Jim Gillis '40 and Ira Lohman. Jim reports that Welles Worthen has a brand new Ford station wagon which is becoming a nightly feature of Hoboken streets. Louis Bradford has tired of shipbuilding in the deep south and is back in New York with George Sharp. — We've heard from a number of you through the medium of Alumni Fund contributions, and for that expression of loyalty, many thanks. Besides knowing that you're still solvent, however, we'd not be prone to reject any additional news. — DALE F. MORGAN, *General Secretary*, 55 Pennsylvania Avenue, Mount Vernon, N.Y. LLOYD BERGESON, *Assistant Secretary*, 885 Beacon Street, Newton Centre, Mass.

1939

From several sources comes news of the wedding of James Gilmore, XII, to Agnes O. Minot of Falmouth, Mass., on September 7. After a honeymoon driving through New England, the couple are making their home in Hyde Park, Vt. — Likewise from several sources, we learn of the marriage of Maynard Drury, XV, to Mary Katharine Fiske of Warren, R.I., on October 12.

Dave Bartlett reports: "I worked from July, 1939, to December for Philips Petroleum Company and then left to take on a company that is pretty well family controlled. It is a lot more fun being the proverbial big fish in the little ocean, and so on. Wingard came out here with his wife and reported for work at Carter Oil and then was sent to Illinois. We had a big time while he was here, and his wife is a swell girl." — And from Gus Griffin, X, in Kentucky: "Whaddya say fellas, finish the book later. I am now employed as an M.I.T. man with Ken-Rad Tube and Lamp Corporation. I can't decide whether to join the Army, go to law school, get married, or hitchhike across the continent. This bourbon isn't bad at all, and every night is party night in Owensboro."

On September 18 C. Arthur Zeldin, III, wrote from Ivanpah, Calif., that he was back again on the job, having returned from the East the week before with his wife. She was a New York girl, and the marriage took place on August 18. The honeymoon was a two weeks' auto trip across the country, taking in quite a few cities along the way and including also many an anxious look at their doubtful motor. At the time he wrote they were living in Ivanpah until additional quarters were constructed for them right at the mine. — With the intrusion of Yale vs. Navy we arrive at an abrupt but cordial ending. — STUART PAIGE, *General Secretary*, Box 207, Greenwich, Conn. MORRIS E. NICHOLSON, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

1940

Laddie Hwoschinsky writes to Dan Crosby that he is very glad to have his new position with Linde Air Products Corporation, where he is to train for a position along the line of thermodynamics in which he specialized at Technology. Laddie started on October 1 and is located in Buffalo, N.Y. Incidentally, he became a United States citizen on October 2 and is eligible for the conscription draft by just those fourteen days. We hear that Jennings Braun is now placed with Seagram Distilleries in Louisville, Ky. Val deOlloqui has been called by the United States Navy and is now working in the New York Navy Yard.

H. E. Woodward, known as Woody to most of us, was married to Anita Chapman in Wellesley recently. Mr. and Mrs. Woodward will live in Cleveland, Ohio. — I'd like very much to hear from some of you class members. Many Tech graduates are located here in the shipbuilding yards but they are apparently members of other classes. I now have the class files and should be glad to assist anyone in obtaining addresses of fellow members. H. GARRETT WRIGHT, *General Secretary*, 324 57th Street, Newport News, Va. DAVID T. MORGANTHALER, *Assistant Secretary*, The Graduate House, M.I.T., Cambridge, Mass.

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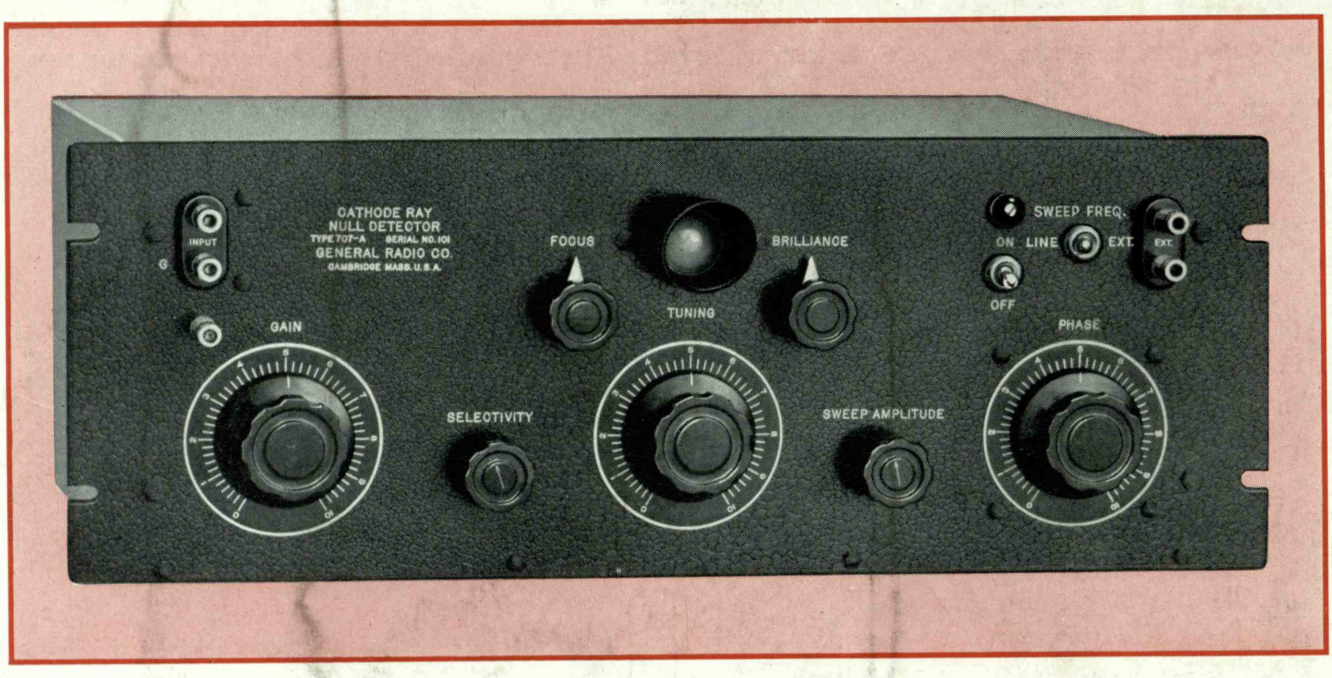
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